THE
AMERICAN
SURGEON

Subscription in the United States, $8.00

Vol. XVII, No. 11 November, 1951

FEMALE UROLOGIC DISORDERS WHICH CAUSE ABDOMINAL PAIN

GERSHOM J. THOMPSON, M.D.*
Rochester, Minn.

IT IS not always a simple task to distinguish between organic disease and so-called functional disorders which produce pain in the female patient. The immediate impression one gains while obtaining the history should be carefully considered, keeping in mind that a diagnosis must be based on factual data with, if possible, irrefutable evidence to back up the conclusions. Often a suspicion of the psychosomatic nature of a complaint is entertained from the time of the first visit but occasionally weeks, or months or even years, pass before the correct answer develops; meanwhile the patient has acquired several operative scars. The psychiatrist will argue that these women with functional disorders have real pain, yet he will more or less willingly go along with or agree to whatever surgical therapy is advised because he usually is unable to offer a quick and certain alternative remedy.

Patients are sometimes told incorrectly that their urethra, bladder, ureter or kidney is causing an indefinite ache or pain and are subjected unnecessarily to treatment of all sorts such as fulguration of the urethra, the passing of ureteral dilators, boughies, bulbs, and so forth, or are subjected to the useless wearing of corsets, belts and supports. If this treatment is confined to methods which are not harmful and if meanwhile reassurance is the principal curative agent employed, and is admittedly such in the mind of the physician, no harm will come from it; in fact, much good may result. But if

Presented during the Hollywood Assembly of The Southeastern Surgical Congress, Hollywood, Fla., April 11-14, 1951.

*From the Section on Urology, Mayo Clinic.

additional pain, fever, destruction of normal tissue and irreversible scarring result, these methods must be condemned.

Urologic diagnostic methods compare very favorably with other specialized procedures in accuracy. However, it must be freely admitted that positive findings of disease in the urinary apparatus do not always solve the patient's complaint nor preclude the existence of other more important lesions which if corrected will result in spontaneous recovery from the lesser disorder. Careful analysis of all the findings which have been gathered in collaboration with the internist and others is an obligation of the urologist. Until all the evidence is weighed it is usually best to withhold therapy.

It is not my purpose, however, to discuss all the important differential diagnostic steps which must be made, for instance, in the case of a patient suffering with upper abdominal pain due either to renal or to biliary tract disease. Nor shall I try to outline all the urologic disorders observed in women. I shall instead discuss the findings in several interesting cases which have recently been encountered at the Mayo Clinic.

Renal Disease

Anomalies of the kidney such as hydronephrosis or duplication of the renal pelvis with pathologic changes in one of the segments, renal fusion (horseshoe kidney) and congenital polycystic disease all can cause lumbar and abdominal pain due to interference with renal function. When there is associated infection fever and chills are often accompanying symptoms. Urologic diagnostic procedures, including excretory urography, cystoscopy and ureteral catheterization, all are useful in establishing the cause of pain. One valuable procedure is the delayed roentgenogram. It is our feeling that the finding of medium retained in the renal pelvis 10 minutes after injection is of considerable clinical significance. Minimal obstruction of the ureteropelvic juncture can be detected in this way.

Renal or ureteral calculi which account for abdominal pain can usually be easily detected by ordinary roentgenographic study. Fortunately, few women suffer from gout. Hence, one can practically disregard the possibility of nonopaque calculi as the cause of abdominal pain.

Anomalies in the position of the kidney (ectopic kidney) seldom cause pain.

The following case report illustrates the necessity for careful scrutiny of roentgenograms in order to avoid error:

Case 1. A woman, aged 29 years, had a chief complaint of attacks of pain in the left flank during the past year. The pain was severe in type, extending

around into the abdomen and left lower quadrant but not into the vagina or perineum. She had had three such attacks. The general physical examination gave normal results except for pyuria of moderate degree. An excretory urogram disclosed that both kidneys were functioning normally. There was a comma-shaped shadow 3 by 1.5 by 0.5 cm. just below the third lumbar transverse process on the left. This apparently was lateral to the course of the ureter, which was not well outlined. The patient was dismissed to her home physician for treatment of the pyuria, no cause being found for the pain. The shadow mentioned was considered to be a calcified lymph node.

She continued to have pain and returned to the clinic 10 months later, when further study, including cystoscopic examination, established the diagnosis of complete duplication of the left ureter with the ureter from the upper segment of the kidney containing a large stone in its midportion. A left heminephrectomy and partial ureterectomy with removal of the calculus was performed. The patient was dismissed from the hospital on the fourteenth postoperative day. She had had no further attacks of pain.

Often it is difficult to determine whether abdominal pain is caused by renal disease or some condition unrelated to the urinary tract. This is illustrated by the following case:

CASE 2. A 37 year old married woman had had intermittent attacks of abdominal pain over a period of years. This pain occurred in the right midabdomen and when it came on it was usually accompanied by gaseous distention. Relief could be obtained by taking an enema. An appendectomy had been done six years prior to admission for acute appendicitis. Two years subsequently an exploration of the abdomen had been done during an attack of pain and an ectopic kidney situated just over the sacrum was noted.

The general physical examination gave essentially normal results. The urine was normal. An excretory urogram showed that the left kidney was normal. The ectopic kidney was situated over the midportion of the sacrum and a retrograde pyelogram showed that it was free of hydronephrosis or calculous disease.

The patient was convinced that her symptoms were related to the anomalous kidney but the consultants who saw her agreed that there was an equal chance that intermittent obstruction of the bowel was responsible for the attacks of pain. An exploration was performed through a primary incision made between the old midline and right perirectus scars. The small bowel was found adherent to the under surface of the abdominal wall in the upper portion of the incision and in dissecting it free it was found that there was almost complete twisting of the bowel. In one area the dissection was particularly difficult and the bowel was entered. A resection of a small segment with an end to end anastomosis was done. In addition, the ectopic kidney with its vascular pedicle composed of numerous scattered arteries and veins was removed. Except for its anomalous shape the kidney seemed otherwise normal.

The patient had an uneventful convalescence and was dismissed from the hospital on the thirteenth postoperative day. Since then she has had no further attacks of pain.

The foregoing cases illustrate unusual conditions due to renal anomalies. Many patients are said to have abdominal pain because

of nephroptosis, but in my experience, unless there is definite evidence of pyelectasis or repeated episodes of renal infection, indefinite aches and pains can not be attributed to the floating kidney. We see each year many women who have a marked nephroptosis without the slightest symptoms. Furthermore, in our experience nephropexy seldom brings relief to the patient for whom a diagnosis of painful ptosed kidney has been made. In any case, urologic findings even if positive must be weighed along with all other data before concluding that treatment confined to the urinary organs will solve the problem. Too often other factors are overlooked to the detriment of the patient.

Ureteral Disease

Almost every urologist has seen women who were said to suffer from ureteral stricture and pain in the abdomen due to ureteral kinks of one kind and another. If there is no evidence of ureterectasis or calculous disease one can usually disregard the ureter as the cause of pain in the female. The promiscuous use of ureteral bulbs, dilators, and bougies which are passed to relieve indefinite abdominal distress in the female is to be deplored.

Ureteral anomalies involving abnormal insertion of the ureter into the bladder so that the meatus is situated in an ectopic position can of course result in definite disease with dilatation of the ureter and hydronephrosis.

Another unusual ureteral anomaly which infrequently causes pain in the female is illustrated by the following case:

Case 3. A woman, aged 42 years, had had intermittent left abdominal pain for a period of several years. In addition she had noted marked difficulty in urinating so that at times it was only by exerting considerable pressure on the abdominal muscles that she was able to void. She was referred to the clinic by her home physician who had made a diagnosis of a large urethral caruncle, there being at the time he examined her a mass approximately the size of the end of a finger presenting in the urethral meatus. This bled slightly and was extremely sensitive. In the course of a trip of several hours to the clinic the mass increased in size so that at the time of admission it appeared to be about the size of a small orange, the surface bleeding freely, and it was extremely painful. The resident who saw her made a diagnosis of incomplete abortion because the mass filled the vaginal introitus, and because of its extreme sensitivity he was unable to palpate it accurately. In addition to much pain there was considerable bleeding.

The mass was carefully examined with the patient under anesthesia. It was quite apparent that it was presenting through the urethral orifice, the small pedicle to which the large mass was attached being approximately the size of a lead pencil. A suture was passed through each edge of the pedicle at the level of the external urethral meatus and the mass excised. The pedicle

quickly retracted up into the bladder, and on cystoscopy it was quite apparent that the tissue had moved over into a position on the left of the trigone. A few small bleeding points were fulgurated and further inspection determined that the protruding mass had been a ureterocele. There was considerable edema and inflammation in this area. The bladder was quite trabeculated—no doubt as a result of the obstruction of the vesical neck which the ureterocele had caused for many months. A small panendoscope could be introduced into the dilated ureteral opening which remained after the excision, and the lower third of the dilated ureter could be easily visualized. A ureteral catheter was passed to the left renal pelvis and another catheter placed in the bladder for continuous drainage.

The patient's convalescence from this procedure was uneventful. A subsequent pyelogram showed only slight dilatation of the renal pelvis and ureter. The diagnosis, of course, was a large left ureterocele which had caused obstruction of the vesical neck and had finally been extruded through the urethra.

Disease of the Bladder

Pain situated over region of the bladder or in either lower quadrant and extending down into the vagina and inner aspect of the thigh is very frequently noted in primary disease of the bladder and urethra. Diverticula and stone formation in the bladder of the female rarely occur. Chronic infections of a nonspecific type sometimes lead to fibrosis and contracture of the bladder. In these cases very annoying symptoms, such as frequency and pain during the act of voiding and pain with minimal distention of the bladder, are often present. When pyuria is also found there is often a tendency to attribute the symptoms entirely to the bladder and at times to overlook disease of the pelvic organs while treatments for cystitis and pyelonephritis are carried on. This is illustrated by the following case:

Case 4. A 63 year old woman had been treated for many years for burning and frequency of urination associated with a sense of pressure in the region of the bladder. A repair for cystocele and rectocele had been done six years previously, since which time she had been treated for interstitial cystitis. There was moderate pyuria. Catheterization showed no residual urine. Culture of the urine disclosed a variety of organisms including *Escherichia coli.*

Cystoscopic examination with the patient under anesthesia revealed considerable scarring in the wall of the bladder, apparently due to previous fulguration, and one stellate area of inflammation which suggested interstitial cystitis. However, the most important lesion was a marked deformity of the posterior wall and left base of the bladder due to extravesical pressure. On bimanual pelvic examination there was a mass approximately the size of a grapefruit which could be easily palpated. Exploration was advised.

A tertiary low midline incision was made (2 operations had been done 36 and 40 years previously). A mass was found in the region of the uterus. This when elevated proved to be a hematometra. The mass was completely removed, a total abdominal hysterectomy being performed. When it was carefully ex-

amined it was found to contain a large dilated uterine and endocervical cavity with flattened endometrial and endocervical lining.

The patient had an uneventful convalescence and has been entirely relieved of her sense of pressure in the lower part of the abdomen and of her urinary frequency.

It must not be assumed that in the ordinary case pressure on the bladder by the pelvic organs results in symptoms. Very seldom indeed do diseased pelvic organs cause urinary distress and it is a certainty that normal structures never produce urinary pain and dysfunction. Psychochemical causes are probably most important in the causation of urinary frequency and dysuria and should always be carefully considered in the evaluation of any case.

Interstitial cystitis is one of the most common causes of low abdominal discomfort in the female. This type of bladder inflammation is often overlooked because of the absence of pyuria. A typical history is that of a woman who must rise four to six times each night to void and who has lower abdominal pain at the time of bladder distention which is relieved by urination. Unfortunately, there is no single specific remedy with which to treat this condition. It was designated by Hunner as the "elusive ulcer" because in its incipiency the lesion is often very difficult to recognize. While with the bladder slightly distended it can, as a rule, be seen readily as a salmon pink area situated in one of the lateral walls or dome, when the bladder is further distended the reddened inflamed area disappears. On overdistention the area will split and bleed freely. Such overdistention, however, must be done with the patient under anesthesia. As stated previously, there is rarely evidence of pyuria and as a rule culture will give negative results.

Urethral Disease

Disease of the female urethra often accounts for distress in the lower part of the abdomen and groin which is very aggravating. Lesions which present in the external meatus, such as prolapse of the mucous membrane, caruncle, skenitis or cicatricial narrowing of the meatus, can be easily recognized. Any of these lesions will respond to conservative therapy such as the application of strong silver protein or ointments of a soothing nature. If excision or fulguration of tissue is carried out, it must be done very cautiously. I believe that in the majority of cases a good response will be obtained without resorting to fulguration. Inflammatory tags in the region of the urethra and vesical neck will usually disappear after three or four applications of strong silver protein.

One lesion which is frequently overlooked is the urethral diver-

ticulum. These distended pouches can be readily palpated as a rule in the anterior vaginal wall but, unfortunately, they are often overlooked because the urethra is not examined carefully throughout its full length. Cystoscopy in such cases will usually show that the bladder is normal, and unless a urethroscope is used the urethra itself cannot be adequately seen. With the direct vision cystoscope or lens vision urethroscope, such as the McCarthy panendoscope, the small opening into the urethra leading into a dilated cavity can be seen. A small, soft ureteral catheter can be passed into the cavity and the diverticulum can be easily outlined with urographic medium. Often it is a simple matter to coil the soft catheter in the diverticulum. Women with this lesion often complain bitterly over a period of years because of infection and repeated episodes of fever, chills and severe pyuria before a diagnosis is made.

Excision of the diverticulum through an incision in the anterior vaginal wall with approximation of the edges of urethra after free mobilization will cure the condition. The relief obtained is very dramatic. Among the most grateful patients I have ever seen are several women with urethral diverticula several centimeters in diameter who suffered for years from an obvious and easily palpable cystic mass on the anterior vaginal wall beyond which a cystoscope had been repeatedly passed because the urologist wanted to find some obscure cause for the distress. The ease with which a lesion of this type can be overlooked is indeed astounding.

Conclusions

Urologic disorders in the female are a frequent cause of abdominal pain. Accurate recognition and treatment is possible by a specific urologic diagnostic procedure. Definite roentgenographic deformity and other positive data must be found before a diagnosis of a specific pathologic process in any portion of the urinary tract can be made. Too often urologists fail to correlate the findings of the internist and gynecologist with urologic observations, and disease in other female structures is overlooked for a time.

In a large number of cases psychosomatic disease is responsible for vague complaints, and it should be possible in these patients to avoid therapy which might cause harm. A negative finding should be reassuring to most patients, particularly if they are made aware that many of the symptoms they have are due to physiologic dysfunction and to the emotional stress and strain which seem to increase steadily. The avoidance of useless operative procedures, both major and minor, is to be highly commended.

ACUTE PANCREATITIS

A Report of Two Cases with Review of Literature

W. G. Ellis, M.D.*
Vicksburg, Miss.

Acute pancreatitis is seen between the ages of 40 and 60, and the occurrence of the disease below the age of 20 is rare. There is a slight preponderance of the female over the male sex. Acute pancreatitis is much more common than is generally believed. Conte and MacGuire report 30 cases over a period of 10 years. The International Medical Hospital reports an incidence of .87 per cent during a 16 month period, there being 45 cases of acute pancreatitis in 5,070 surgical admissions.

Etiology and Pathogenesis. As in any disease in which the etiology and pathogenesis are not proven, there are several explanations offered. It has been demonstrated by such men as Bernard in 1856, later by Archibald and Opie and more recently by Dragstedt, Haymond and Ellis[6] that reflux of bile into the pancreatic duct system, secondary to common duct obstruction, either by impacted stone or by spasm of the sphincter of Oddi, is the important etiological factor. This statement is supported by the fact that biliary tract disease is present in approximately 60 per cent of the patients suffering from acute pancreatitis. Ten per cent develop common channels as a result of impaction of a stone in the ampulla and a majority of the remainder have a continuous channel because of spasm of the sphincter of Oddi or edema of the papilla. In this group the immediate cause of necrosis in the pancreas is the passage of bile over into the pancreatic ducts. Ravdin[5] believes that the remaining 30 to 40 per cent of the clinical cases are due to such factors as edema of the mucosa of the ampulla, vascular damage due to rupture of the vessels, embolism or thrombosis, infection by various routes and direct trauma to the gland. Metaplasia of cells within the duct producing obstruction and consequent rupture and extravasation of secretion, as expressed by Rich and Duff, is an important contribution to the pathogenesis.

The most widely accepted theory of the pathogenesis of acute pancreatitis is the release of trypsin and its precursor into the interstitial tissue of the pancreas. The principal controversial point in the pathogenesis as pointed out by Ravdin and Johnston[5] is "whether or not trypsin acting alone may produce a lesion by causing necrosis of the blood vessel walls and hemorrhage into the tissue; or whether,

*From the Surgical Service of Dr. August Street, Mercy Hospital, Street Memorial, Vicksburg Miss.

as in biliary regurgitation, bile salts by virtue of the cytolytic action, is the fundamental factor in the production of the local lesion and its destructive effect maintained by the action of trypsin on the protective protein of the inflammatory exudate." Contributing factors which are noteworthy are: trauma, regional infection with extension to the pancreas and precipitation of attacks by ingestion of alcohol.

Forms of the Disease. It is generally agreed that acute pancreatitis should be divided into the acute edematous or interstitial type and the acute hemorrhagic or necrotic type. This seems to be possible clinically because the former group is much milder and is never associated with shock.

Physiological Chemistry Associated with Acute Pancreatitis. The internal secretion of the pancreas is mainly insulin; whereas, the external secretion is coagulable protein, inorganic constituents, and three enzymes; namely, trypsin, amylase, and lipase. Trypsin is activated when it comes in contact with even a small amount of intestinal content. Calcium salts alone can activate trypsin. Amylase, which digests starches, requires the chloride ion, as well as others. Amylase in acute pancreatitis is present in large amounts in the blood and in small amounts in the urine, feces, lymph and milk. Lipase, which digests fats, splitting them into fatty acids and glycerin, has its action much enhanced by the presence of bile salts. When it escapes its normal channels, it produces fat necrosis. Lipase is present in fairly large amounts in the blood as well as in the urine.

Symptoms and Signs. A classical description of a patient with acute pancreatitis is "that of a patient complaining of agonizing, upper abdominal pain and presenting signs of pronounced shock and circulatory collapse."[11] However, studies show that this is not classical but is rarely seen. Pain is the first and foremost symptom of this disease[15] and seen in essentially 100 per cent of the cases. It is severe, persistent, and has been described as excruciating, knife-like pain and is usually not relieved by the average dose of morphine. It is commonly located in the epigastrium, radiating to the costal margin, back, shoulder or axilla, or to the costovertebral angle. Nausea and vomiting is considered to be second in frequency and sequence and is usually seen in 75 per cent of the patients. It occurs early, is repetitious, may be prolonged, and in some instances persists after pain subsides. Shock which has been described as classical is uncommon but it may well be associated with the fulminating cases. Jaundice, from deep to slight, is present in one-fourth to one-third of the patients.

The outstanding physical sign is tenderness, commonly located

in the epigastrium but may vary to all quadrants of the abdomen and may be generalized. Muscle spasm is present in about one-half of the cases. Abdominal distention which is due to progressive ileus, generally appears 48 to 72 hours following the onset and its degree depends upon the severity of the illness. An abdominal epigastric mass may or may not be present. In 10 per cent of the patients the so-called Cullen's and Grey-Turner's sign is present and is described as a bluish discoloration in the flank accompanied by a palpable edema and induration.

Laboratory Examinations. The serum or urine amylase or lipase is the most important diagnostic laboratory procedure. It is increased within a few hours after the onset of the disease but reaches a peak within 48 to 72 hours after which it rapidly returns to normal. A normal reading may be seen in the fulminating cases. It should be remembered that elevated serum amylase is associated with acute parotitis, renal failure, and perforation of the gastrointestinal tract, in addition to acute pancreatitis. A normal range is usually 80 to 150 units, 150 to 200 units is high normal and a reading above 200 units is definitely abnormal. Leukocytosis is a rule with acute pancreatitis and is generally over 20,000. Hyperglycemia is an uncommon finding but may be expected in the severe form of the disease. Urinalysis generally shows albuminuria, glycosuria being rare. The icterus index frequently reveals subclinical jaundice. Hypocalcemia is usually associated with the devastating form of the disease, which is due to the large quantity of calcium used to saponify the fat.

Diagnosis. The most important factor in the diagnosis of acute pancreatitis is to include it in the differential diagnosis. Next in importance is frequent amylase determinations which are easily carried out, are conclusive and results are obtained in three to four hours. Although there are no signs and symptoms which are pathognomonic of acute pancreatitis, the following should be emphasized: (1) pain and vomiting which is persistent, (2) tenderness with muscle spasm that is out of proportion to the severity of the pain (3) leukocytosis over 20,000, (4) palpable mass or the presence of Cullen's or Grey-Turner's sign, and (5) distention which is a late manifestation.

As Morton[15] has stated, "the diagnosis should be suggested by sudden intense pain, vomiting, the apparent severe blow to the patient, localization of tenderness, distention, the absence of fever with the presence of a relatively rapid pulse and high white blood count."

Differential Diagnosis. These patients are most commonly admitted with the diagnosis of acute cholecystitis. Acute pancreatitis may be differentiated when the patient suffers more pain and vomiting than the usual acute gallbladder, when leukocytosis is higher, and when the tenderness is located away from the site of the gallbladder. Perforated peptic ulcer and intestinal obstruction are commonly confused with acute pancreatitis. With perforated peptic ulcer, muscular rigidity is more pronounced, leukocytosis is not as great and x-ray of the abdomen may be diagnostic. As to intestinal obstruction, particularly high intestinal obstruction, the vomiting is progressive and may be feculent, and x-ray of the abdomen may prove to be conclusive. Myocardial infarction is often considered but there is a different pain distribution and rarely do you see an initial high white blood count. Other diseases of lesser importance which should be included in the differential diagnosis are: mesenteric thrombosis, appendiceal disease, peritonitis, ruptured ectopic pregnancy, biliary colic and "postcholecystectomy syndrome." Abdominal paracentesis which has been used by Morton[15] as an aid to differential diagnosis should be mentioned. He recovered the characteristic prune juice fluid from the peritoneal cavity which he considered to be diagnostic.

Treatment. The treatment of acute pancreatitis is quite controversial but recently is leaning toward the conservative method of treatment. It is generally agreed that conservative treatment should consist of relief of pain, restoration of the normal blood concentration, prevention of distention and prophylaxis against suppuration. The patient should be observed for diabetes, liver deficiency, and hypocalcemia. The majority of surgeons in recent years have leaned toward the conservative method of treatment during the acute stage of the disease followed later by surgery. In a review of a large series of cases of various authors, it was shown that in cases operated early there was a 49 per cent mortality; whereas, in delayed or interval operation, there was only an 18 per cent mortality. In the nonoperative cases diagnosed as acute edematous pancreatitis there was a 5.7 per cent mortality; whereas, those with acute hemorrhagic necrotic pancreatitis had a mortality of 60.8 per cent. In a recent study of patients who had immediate surgery as compared to those treated conservatively, it was shown clearly that the conservative treatment resulted in a marked drop in the mortality rate. Fallis[11] has shown that the mortality for these patients treated surgically was 46.2 per cent, as compared to 6.3 per cent for those treated conservatively. The group which supports the theory of immediate surgery contend, "if the etiology in most cases is bile reflux due to mechanical obstruction or spasm and if in the remaining

cases the etiology is obscure or undeterminable, are we not justified in doing the one thing which will do the greatest good to the greatest number, that is relieving or removing obstruction by biliary decompression?"[14] They further point out that the question of differential diagnosis is solved by early surgery. DeTakats and Mackenzie[13] of Chicago agree that patients should have surgery but they emphasize that it should be done either in the first 24 hours or delayed three weeks. In the interval between the first 24 hours and three weeks there was a mortality rate of 50 per cent.

The most difficult factor in the nonoperative treatment of acute pancreatitis is the ability to make the correct diagnosis for it may be dangerous to delay surgery if other acute abdominal conditions are present. However, this doubt can often be eliminated by blood amylase determination. If the conservative treatment is adopted, it should be done so only after reasonably certain diagnosis; but, should expectant treatment be instituted, close observation is necessary. DeTakats and Mackenzie[13] have formulated four principles which seem to be logical to follow in the evaluation of these patients: "1. Never operate on a patient in initial shock. 2. If the diagnosis is certain, delay is permissible. 3. If the diagnosis is uncertain then early operation should be seriously considered. 4. If the attack is mild, wait for recovery and proceed with diagnostic procedure."

Surgical treatment of the disease is also a controversial point. It is fairly well agreed by such men as Cole,[8] DeTakats and Mackenzie[13] and others, that cholecystostomy is the procedure of choice. Cholecystectomy with choledochostomy is certainly to be desired if the patient's condition warrants surgery. Operation for subsiding acute pancreatitis or recurrent pancreatitis has been performed in several ways. Decompression of the biliary tract by such procedures as cholecystostomy and choledochostomy to prevent reflux of bile is considered to be effective as long as the drains remain. Sympathectomy can be mentioned but is not a direct attack on the disease. Block of the splanchnic nerve group has been performed on several occasions by M. Gage of New Orleans and he believes that it is quite beneficial in the relief of pain to these patients. Vagotomy to paralyze the sphincter of Oddi might be effective but it deprives the gastrointestinal tract of its motility. Local nerve interruptions seem rational and have been advocated but apparently only temporary relief is obtained from this procedure. Archibald first directly approached the problem by cutting the sphincter of Oddi in a patient with recurrent pancreatitis when he had to section the sphincter to remove a stone. Following this, uniformly good results were obtained. Dr. Alton Ochsner of New Orleans reports 2 cases in which

he has performed a plastic procedure on the common duct, made by making a transductal incision and suturing the ductal mucosa to the duodenal mucosa. This idea was condemned, however, by Doubilet and Mulholland,[3] Bellevue Hospital, on the basis that the obliquity of the common bile duct into the duodenal wall is destroyed and regurgitation of bile contents into the biliary tract will occur. However, Mayo Clinic Group have performed choledochoduodenostomy in the past several years for this condition with good results.

The Treatment of Complications and Sequelae. The treatment of recurrent pancreatitis is the same as discussed above. Pancreatitic abscesses and pancreatic cysts may be seen in certain cases. Warren[12,16] of the Lahey Clinic believes that external drainage (marsupialization) should be instituted early to prevent the cysts from acquiring a thick rigid wall. This also holds true for pancreatic abscesses. Diabetes mellitus should be kept in mind and laboratory procedures done frequently to discover it. Some patients develop so-called "pancreatic asthenia" in which the patient refuses all nourishment and gradually loses weight and strength. Pancreatic extract is recommended for this type of patient. Fatty degeneration of the liver may occasionally be seen and is treated with lipocaic as suggested by Dragstedt.[6] Complications include empyema, subdiaphragmatic abscess, disruption of the wound and incisional hernia.

Case Reports

Case 1. A. L. B., W. F., aged 23, admitted on Jan. 26, 1951, with a history of intense epigastric pain which developed following the noon meal. She received 100 mg. of demerol, as an out-patient, but obtained only temporary relief. She returned to the clinic with intense, excruciating pain, boring through to the back. This was associated with profound vomiting. Past history revealed evidence of recurrent attacks of upper abdominal pain, usually in the epigastrium, which lasted two or three days and gradually subsided. The other significant factor was weight loss of 15 pounds for the past several months.

Examination: Temperature 97, pulse 76, blood pressure 100/60, respiration 18. The patient was thin, rather poorly nourished and was obviously suffering from severe abdominal pain. There was generalized abdominal tenderness and spasm with maximum intensity in the midepigastrium.

Laboratory Examinations: Blood sugar 124 mg. Roentgenological examination revealed minimal gas in the intestinal tract, no free air under the diaphragm. Complete blood count revealed leukocytosis and evidence of hemoconcentration.

Admission impression: Diagnosis, undetermined.

Course: The patient was admitted to the hospital for observation. In view of the fact that acute pancreatitis was suspected, a serum amylase was ordered. It was elected that conservative treatment which consisted of decompression of the gastrointestinal tract, sedation for pain, correction of blood volume, and

intravenous calcium would be followed until a report could be obtained from the laboratory. Serum amylase reported was 1,415 mg. and this was commensurate with the diagnosis of acute pancreatitis. Therefore, conservative treatment was continued throughout the hospital course, this being a period of approximately two weeks. She suffered intense pain through the early course of her hospital stay but at no time did she suffer actual shock. Repeated serum amylase determination revealed a progressive fall to 765 mg. in two days, 152 mg. in five days and 94 mg. in eight days.

After convalescence, the patient was dismissed, instructed as to diet and was to return for observation. However, two weeks following dismissal she had to be readmitted to the hospital because of recurrence of symptoms similar to those previously described. A repeat serum amylase was 135½ mg., white blood count 9,300, urine normal without evidence of concentration. Conservative therapy was instituted until subsidence of the disease and on March 14, 1951, laparotomy revealed biliary tract disease. A cholecystectomy and Choledochostomy were carried out, cutting the sphincter of Oddi and leaving a T tube in the common duct. Convalescence has been satisfactory.

Case 2. J. J. N., W. F., aged 55, admitted on Oct. 10, 1950, with a history of onset of acute right upper quadrant pain 24 hours previously, associated with nausea and vomiting, the pain radiating to the right costovertebral angle. The pain was described as colicky, increasing in severity, and progressive and only slightly relieved by hypodermic. She related a past history of hypertensive cardiovascular disease and recurrent attacks of right upper quadrant pain.

Examination: Blood pressure 240/110, pulse 100, temperature 99, respiration 30. Observation revealed an acutely ill patient who was sighing and complaining very severely of pain in the right upper abdomen. Heart was slightly enlarged. Abdominal examination revealed acute exquisite tenderness in the right upper quadrant with spasm of the right rectus and moderate tenderness in the right costovertebral angle.

Laboratory Examination: White blood count 19,800 and evidence of hemoconcentration. Urine filled with pus. Sedimentation rate 29 mg.

Admission impression: Acute cholecystitis with or without cholelithiasis, possible acute pyelonephritis.

Course: It was elected to treat this patient conservatively. Two weeks following admission, subjectively and objectively, the patient had made marked improvement. X-ray of her gallbladder on October 25 revealed a pathologically functioning gallbladder without evidence of stone, and it was elected to explore the gallbladder. On November 4 a cholecystectomy and choledochostomy were done, cutting the sphincter of Oddi and leaving a T tube in the common duct. Pathological diagnosis rendered was: chronic cholecystitis; chronic cholelithiasis; fat necrosis of the tissue from the greater omentum. Following surgery the patient developed a marked jaundice which gradually cleared over a period of several days. There was some abdominal distention with intense nausea, pain in the epigastric area of the abdomen which bored through to the back. However, all of these symptoms gradually subsided and her convalescence was not further unfavorably altered.

Conclusions

The most important factor in making a diagnosis of acute pancreatitis is to think of the possibility and obtain a serum amylase.

Biliary tract disease is probably the most common etiologic factor in the development of acute pancreatitis. Prophylactic eradication of this source of the disease is justifiable. If spasm or obstruction at the ampulla is present, cutting the sphincter of Oddi as suggested by Archibald seems to give uniformly good results. It is generally agreed that the treatment of acute pancreatitis should be conservative, followed later by surgery. Recent literature indicates clearly that most surgeons are obtaining better results by treating the disease conservatively at first, followed later by surgery. It seems justifiable to perform a laparotomy when the diagnosis is uncertain and blood amylase studies are not conclusive.

REFERENCES

1. Weiner, H. A., and Tennant, R.: Statistical study of acute hemorrhagic pancreatitis (hemorrhagic necrosis of pancreas), Am. J. M. Sc. *196:*167 (Aug.) 1938.
2. Coffey, R. J.; Barnes, E. B.; Reed, P., and Brandt, F. B.: Diagnosis and treatment of acute pancreatic disease, Postgrad. Med. *8:*191 (Sept.) 1950.
3. Doubilet, H., and Mulholland, J. H.: Recurrent acute pancreatitis; observations on etiology and surgical treatment, Ann. Surg. *128:*609 (Oct.) 1948.
4. Metheny, D.; Roberts, E. W., and Stranahan, A.: Acute pancreatitis with special reference to x-ray diagnosis, Surg., Gynec. & Obst. *79:*504 (Nov.) 1944.
5. Ravdin, I. S., and Johnston, C. G.: Etiology and pathogenesis of acute hemorrhagic pancreatitis, Am. J. M. Sc. *205:*277 (Feb.) 1943.
6. Dragstedt, L. R.; Haymond, H. E., and Ellis, J. C.: Pathogenesis of acute pancreatitis (acute pancreatic necrosis), Arch Surg. *28:*232 (Feb.) 1934.
7. Elman, R.: Surgical aspects of acute pancreatitis, with special reference to its frequency as revealed by serum amylase test (Max Bellin lecture), J.A.M.A. *118:*1265 (April 11) 1942.
8. Cole, W. H.: Acute pancreatitis, with special reference to pathogenesis and diagnostic value of blood amylase test, Am. J. Surg. *40:*245 (April) 1938.
9. Casberg, M. A.: Acute pancreatic necrosis and acute interstitial pancreatitis; treatment without operation; clinical study of ten cases, Arch. Surg. *39:*247 (Aug.) 1939.
10. MacGuire, C. J., and Conte, A. J.: Acute pancreatitis, Ann. Surg. *127:*557 (March) 1948.
11. Fallis, L. S.: Acute pancreatitis, Am. J. Surg. *46:*593 (Dec.) 1939.
12. Warren, K. W.: Acute pancreatitis, S. Clin. North America *28:*741 (June) 1948.
13. de Takats, G., and Mackenzie, W. D.: Acute pancreatic necrosis and its sequelae; critical study of thirty cases, Ann. Surg. *96:*418 (Sept.) 1932.
14. Pfeiffer, D. B., and Miller, D. B.: Surgical management of acute pancreatitis, Am. J. Surg. *80:*18 (July) 1950.
15. Morton, J. J., Jr.: Acute pancreatitis, New York State J. Med. *40:*255 (Feb. 15) 1940.
16. Grollman, A. I.; Baum, G. L.; Moss, H. K., and Goodman, S.: Acute pancreatitis with particular reference to its frequency and difficulties in diagnosis, Surgery *29:*163 (Feb.) 1951.
17. Boyd, W.: Surgical Pathology, ed. 5, Philadelphia, W. B. Saunders Company, 1942, p. 346.

18. Cole, W. H.: Treatment of acute pancreatitis; collective review, Internat. Abstr. Surg. *67:*31; in Surg., Gynec. & Obst. (July) 1938.

19. Warren, K. W.: Pancreatic cysts, S. Clin. North America *28:*753 (June) 1948.

20. Best, C. H., and Taylor, N. B.: The Physiological Basis of Medical Practice, ed. 2, Baltimore, Williams & Wilkins Company, 1939, p. 727.

21. Comfort, W. W.: Syndrome of progressive destruction of pancreas, Collect. Papers Mayo Clin. & Mayo Found. *40:*46, 1948.

22. Gambill, E. E.: Chronic relapsing pancreatitis; review of cases in which disease of biliary or gastrointestinal tract did not coexist, Proc. Staff Meet., Mayo Clin. *22:*537 (Nov. 26) 1947.

23. Meade, R. H., Jr.: Massive pancreatic hemorrhage; case report, Ann. Surg. *124:*363 (Aug.) 1946.

24. Brodie, N. N., and Ficarra, B. J.: Acute hemorrhagic pancreatitis; new etiological concept and case report, Am. J. Surg. *63:*394 (March) 1944.

INTRAMEDULLARY SPINAL CORD METASTASES FROM MELANOMAS

Report of an Unusual Case and a Review of the Literature

C. B. CLAY, M.D.*
A. H. WEILAND, M.D.**
Miami, Fla.

INTRAMEDULLARY metastatic tumors of the spinal cord are rare. Probably the first case reported was that of Buchholz[1] who, in 1898, described metastatic nodules within the cord in a case of carcinoma of the breast associated with cerebral metastases. Hofheinz[2] also found a single intramedullary metastasis of the thoracic cord in a case of breast carcinoma with cerebral metastases.

Taniguchi,[3] Nonne,[4] Hilpert[5] and Simpson[6] reported intramedullary metastases from carcinomas of the lung. Belz[7] reported a solitary metastasis from a renal carcinoma. Cary[8] described a case of chorio-epithelioma with widespread metastases and a cystic metastasis in the cauda equina. Haler[9] reported a case of a 17 year old boy with a sarcoma of the testicle and multiple metastatic lesions of the cord.

A careful study of the available literature was made and only 2 authenticated cases of intramedullary metastatic melanoma could be found. In 1903, Gallavardin and Varay[10] described a case of a skin melanoma with multiple deposits in the brain and cord. Roulet,[11] in 1929, described a similar case with the primary melanoma on the skin of the axilla. There were widespread metastases to numerous organs including the brain and cervical cord.

Several cases were encountered in the literature of intramedullary melanomas found at surgery. In none of these cases, however, could the diagnosis of metastatic melanoma be ascertained. In discussing a series of 68 cases of intramedullary cord tumors, Woods and Pimenta[12] described a melanoma removed from the dorsal cord. No primary site was found and no autopsy was performed. Frazier and Allen[13] mentioned a case collected from the literature, but did not specify whether it was primary or secondary. Kernohan[14] cited 3 cases of intramedullary melanomas from a series at the Mayo Clinic. Here again the author did not state the origin of the tumor. In none of these cases encountered at surgery was there a description of the leptomeninges overlying the tumor. One would suspect

*From the Department of Pathology (Dr. Philipp R. Rezek, Director), Jackson Memorial Hospital, Miami.

**Director, Department of Orthopedics, Jackson Memorial Hospital, Miami.

that if the primary tumor was in the spinal cord, that it arose from the pia mater and invaded the medullary substance.

The following case is reported because of the apparent rarity of the condition and because of the difficulty encountered in establishing the diagnosis.

Case Report

A 30 year old commercial airline pilot was admitted to Doctors Hospital, Coral Gables, Fla., on Apr. 7, 1950 complaining of pain in the neck, numbness and tingling of both arms and hiccoughs.

Six weeks prior to admission while engaging in amateur theatricals, the patient's neck was injured during a choking scene. Two weeks later he noted tingling in the left hand and arm followed in a few days by similar sensations in the right hand and arm. After about two weeks this became severe and constant and was associated with pain and stiffness in the back of the neck. Ten days prior to admission he began to have episodes of hiccoughs which became more prolonged and frequent.

On the day of admission, while walking along a city thoroughfare, he suddenly felt as though he were going to faint and walked into a physician's office, where he "had an attack of syncope without total loss of consciousness associated with feeble pulse and respiration and general shocklike condition."

Family history and past medical history were noncontributory. He had a mole removed from the right forearm four years prior to admission.

Physical examination revealed an apprehensive, well developed and well nourished young man who had incessant hiccoughs.

Temperature was 98.6°, pulse 80, respiration 16.

The chest was clear. The heart was normal. Examination of the abdomen and genitourinary system showed no abnormality. Examination of the skin showed a rather large scar on the flexor aspect of the right forearm and a small elevated pigmented mole just above the upper lip. There was moderate limitation of flexion and rotation of the cervical spine and forced flexion caused some pain.

Neurological examination showed the optic discs and fundi to be normal. The cranial nerves were intact. There was no muscular weakness. Grip of the right hand was 105 K. and the left hand 120 K. The patient was left-handed. No sensory changes were noted. Vibratory and position senses were normal. There were no abnormal reflexes. Cerebellar function appeared normal.

Urinalysis on admission was within normal limits. R.B.C. 4,950,000; Hb. 95 per cent; W.B.C. 18,000; stabs. 4; Segs. 64; lymphs 31; monos. 1. X-rays of the cervical spine two days prior to admission showed "anterior displacement of C-5 on C-6 with a moderate degree of alteration of the normal anterior cervical convexity at this level."

On admission, head traction was applied but was discontinued after five days. During this time the patient began to vomit profusely with only slight nausea. This continued along with hiccoughs for the duration of the illness so that nutrition was a serious problem.

The patient complained of more and more pain in the neck, shoulders and arms. On the eighth day after admission he complained of weakness and clumsiness of the right leg and urinary retention. Neurological examination on that day showed marked weakness of the right upper and lower extremities and a positive Babinski on the right. Spinal tap on this date showed an initial pressure of 140 mm. and a final pressure of 100 mm. The fluid was grossly clear. Queckenstedt test was not recorded. Examination of the fluid showed a positive Pandy. Total proteins 104 mg.; Kline was negative; W.B.C. 4. All white blood corpuscles were polymorphonuclears.

On the ninth day, X-rays of the skull and cervical spine were reported normal. Arteriogram of the left carotid artery, myelogram and pneumo-encephalogram were done on the same day and reported normal except for "a rather wide spinal canal in the cervical region." Urinalysis at this time showed many white blood corpuscles, red blood corpuscles and granular cast.

On the tenth day, the temperature rose to 102° and the pulse to 120. The temperature remained between 102° and 105.6° and the pulse between 100 and 140 for the remainder of the course of the illness. The patient could retain no feedings and all nourishment was given intravenously.

Chest x-ray on the twelfth day showed only some pleural thickening.

On the thirteenth day, the patient suddenly developed quadriplegia, intercostal paralysis and loss of all sensation below the level of C-3. He was placed in a Drinker respirator. The diaphragm continued to function and the patient could swallow until the eighteenth day, when a tracheotomy was performed. He remained mentally clear until just prior to death on the twenty-eighth day.

Synopsis of Autopsy Findings

External examination revealed a poorly nourished young male with evidence of recent weight loss and some muscular wasting. The skin had a light yellowish discoloration. There was a large scar on the flexor surface of the right forearm. A pedunculated, roughened, hemorrhagic, brownish black mole was present just above the upper lip which was approximately ½ cm. in diameter. No superficial lymph nodes were palpable.

The heart appeared normal. The lungs showed evidence of congestion and edema. The mediastinal lymph nodes were markedly enlarged. The largest was 5 cm. in diameter. They were rather soft and on section had a bluish black, mottled appearance. Areas of fresh and old hemorrhage were seen.

There was a terminal or postmortem rupture of the anterior portion of the pylorus of the stomach. No inflammatory reaction or ulceration was evident in this area. On the posterior wall of the first portion of the duodenum, there was a rather large, deep peptic ulcer with a granular base.

The liver, spleen and kidneys showed signs of chronic congestion. In addition, the spleen showed a soft, blackish, mottled tumor mass which was about 2 cm. in diameter and appeared fairly well circumscribed.

Examination of the brain showed the meninges to be intact. No generalized cerebral edema or malacia was present. In sectioning the brain, a solitary tumor mass was found in the left frontal lobe. The mass was approximately 2 cm. in diameter. It was soft and had a brownish black, mottled appearance. There was cystic degeneration of the central portion. It appeared to be well circumscribed and was surrouded by a narrow periphery of localized malacia (fig. 1). It lay entirely in the white matter and was about 4 cm. posterior

to the most anterior portion of the lobe. It did not involve the basal nuclei or the lateral ventricle.

When the cord was removed, there was seen to be a tapering area of enlargement and malacia of the cervical cord. This process extended from the lower-

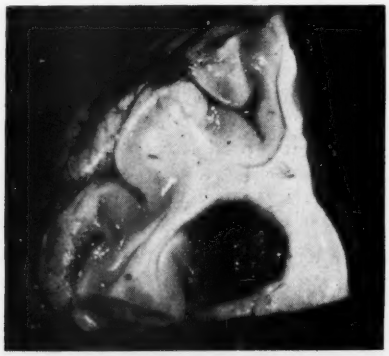

Fig. 1. Solitary metastasis of left frontal lobe.

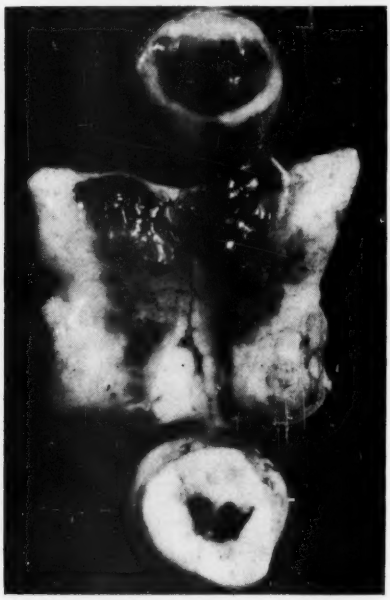

Fig. 2. Saggital and cross sections of cervical cord. Upper cross section from area of 1st cervical segment shows large part of cord replaced by tumor, yet meninges are intact.

most portion of the medulla oblongata to the level of the fifth cervical segment. When this area was sectioned, the center was seen to be occupied by a soft, grayish black tumor showing numerous areas of hemorrhage. The tumor was

surrounded by a peripheral ring of softened cord about 2 mm. in thickness. The meninges were intact (fig. 2).

Synopsis of Microscopic Findings

Microscopic sections of the mole removed from the lip showed a tumor overlaid by a well defined stratified squamous epithelium. There was marked hemorrhage into the corium. The tumor was poorly defined and made up of polyhedral cells arranged in alveolar groups. The cell groups were separated by fine strands of connective tissue. The cells were pleomorphic and some contained fine granules of brownish pigment. The nuclei were pleomorphic and hyperchromatic. Numerous mitoses were present. Extruded pigment was present between the cells.

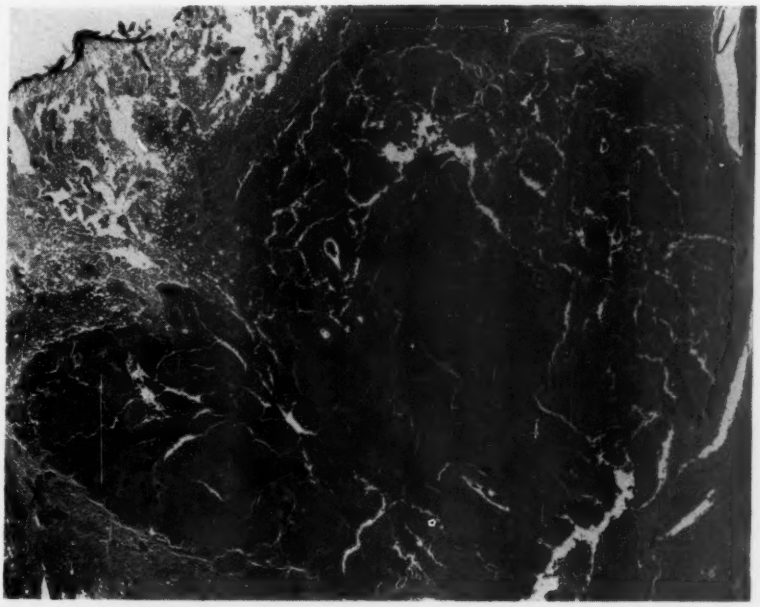

Fig. 3. X 8 through upper cervical cord showing extent of tumor and hemorrhage.

Sections of the lungs showed the smaller bronchioles to contain large amounts of pus cells, fibrin and mucus. The vessels of the alveolar walls were congested. Many of the alveoli were filled with pink, homogeneous edema fluid.

The hilar lymph nodes showed most of the normal structure to be replaced by tumor tissue similar in all respects to that of the tumor of the lip.

The heart showed no striking changes.

The liver, spleen and kidneys showed rather marked acute and chronic passive congestion. Section through the tumor nodules of the spleen showed it to be an invasive tumor with a pattern similar to the other tumor masses.

Serial sections through the brain showed no abnormalities except in the area of the solitary metastatic lesion. Here, an infiltrating tumor was seen similar in all respects to the lesion in the cervical cord.

Microscopic examination of the upper cervical cord showed the central two-thirds to be made up of a slightly irregular, invasive tumor mass (fig. 3). There was a large amount of old hemorrhage present. The tumor consisted of large, polyhedral cells which were arranged in alveolar groups. The cell groups were separated by fine connective tissue fibrils. The cells were pleomorphic and contained a few fine granules of yellowish brown pigment. The nuclei were hyperchromatic, pleomorphic and contained large nucleoli. A few mitoses were present. Some small blood vessels were seen to be related to the tumor and could be seen in plugs of tumor tissue. The tumor cells adjacent

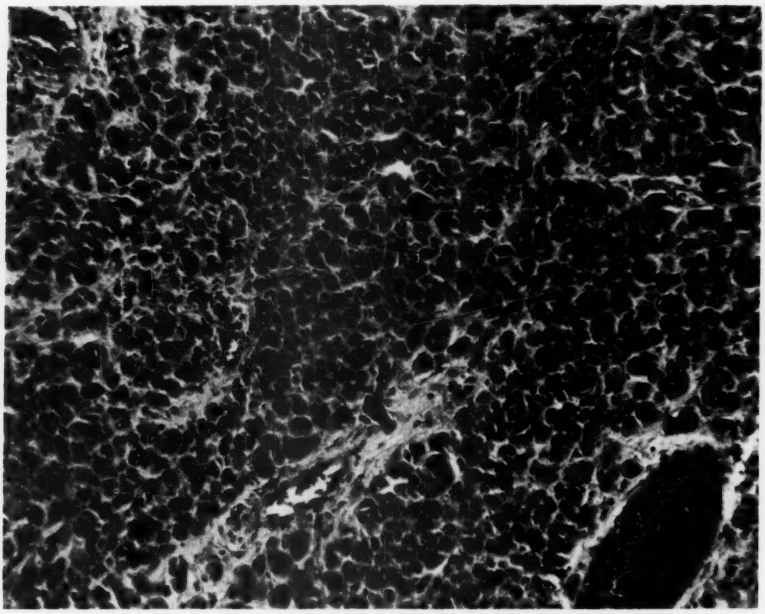

Fig. 4. X 81 of the cord metastasis showing typical pattern of melanoma.

to the vessels were well preserved. The farther the cells were from the vessels, the less preserved they became until at the periphery, necrosis was present. There was less pigment present here than in the other tumor masses (fig. 4). Special pigment stains indicated that the pigment present in the tumor nodules was melanin.

The zone of the cord immediately surrounding the tumor showed marked changes in the form of hemorrhage, demyelinization and necrosis. The few remaining ganglion cells showed tigrolysis and clumping of the Nissle bodies. The nuclear changes included pyknosis, rhexis and finally destruction and expulsion of the nucleoli. In some areas, only shadows remained at the site of the ganglion cells.

The meninges in this area showed no involvement by tumor.

Pathological Diagnosis

1. Malignant melanoma of the upper lip.
2. Metastases to brain, cervical cord, hilar lymph nodes and spleen.
3. Acute bronchiolitis.
4. Acute pulmonary edema.
5. Acute and chronic congestion of lungs, liver, spleen and kidneys.
6. Terminal rupture of the stomach.
7. Duodenal ulcer.

Comment

The tumor removed from the right forearm four years prior to death was examined microscopically in this laboratory and showed the typical picture of a pigmented malignant melanoma. It is impossible to say whether it was this lesion or the lesion on the lip which gave rise to the metastases. It is a well established fact that metastases from melanomas of the skin may appear in a very short time, or they may appear many years after the removal of the primary skin growth.

It is interesting to note that in our case, as well as in the other 2 authenticated cases, the lesion giving rise to the intramedullary cord metastases was on the skin. According to Rasmussen, Kernohan and Adson,[15] most cerebral metastases also arise from skin lesions.

Cases have been reported by Pette,[16] Seifert,[17] Greeves,[18] Neame[19] and Courville[20] in which there was spread of a melanoma from the cerebrum to the meninges of the cord via the spinal fluid. In these cases, there were melanoma nodules in the brain adjacent to the subarachnoid space. Tumor cells set free in the spinal fluid spread to the most dependent portion of the cord and formed a sheath around the meninges. Obviously, this was not the mode of spread in our case as the metastases of the brain and cord were intramedullary in location and the meninges were not involved.

After reviewing the literature, it appears that the most common intramedullary metastases of the spinal cord are from melanomas and carcinomas of the lung and breast. These are the same tumors that give rise to so many cerebral metastases.

Different authors vary as to the incidence with which melanomas metastasize to the central nervous system. Courville and Schillinger,[21] in reviewing a series of melanomas studied at autopsy, state that 50 per cent metastasize to the brain. According to Bailey,[22] nearly half of melanomas metastasize to the brain. Bonnet[23] found cerebral metastases in 39 per cent of his series. Moersch[24] *et al.*

reviewed 347 cases of melanomas of which only 10 per cent involved the central nervous system.

Since melanomas so commonly metastasize to the brain, it seems strange that so few cases of intramedullary cord metastases have been reported. Willis,[25] who reviewed the subject thoroughly in his textbook on the spread of tumors, states: "Metastatic growths in the spinal cord may be less rare than is supposed. This organ is seldom examined in routine autopsy work unless there have been symptoms of clinical disease in it, and symptoms due to cord lesions may often be submerged to those due to coexisting cerebral lesions."

Although we can not give any other explanation of this phenomenon, we would disagree with Willis because, in our case, as in other reported cases, the cerebral metastasis was in a "silent area" of the brain and caused no overt symptoms. In the case previously cited by Hofheinz, the patient had seventeen cerebral metastases; yet all symptoms were referrable to the cord lesion.

Conclusion

1. An unusual case of an intramedullary spinal cord metastasis from a melanoma has been reported and the literature reviewed.

2. The discrepancy in the incidence of cerebral metastases and cord metastases from melanomas has been discussed.

3. This is another example of the bizarre metastases which may occur from melanomas. Whenever there is a history of a mole being removed or whenever a suspicious skin lesion is present, the possibility of a metastatic melanoma must be kept in mind.

REFERENCES

1. Buchholz, quoted by Willis.[25]
2. Hofheinz, G.: Zur kenntnis der metastatischen Karzinose des zentral nervensystems, Deutsche Ztschr. f. Nervenh. *117-119*:226, 1931.
3. Taniguchi, quoted by Willis.[25]
4. Nonne, quoted by Willis.[25]
5. Hilpert, P.: Metastatic carcinoma of central nervous system, Arch. f. Psychiat. *77*:93, 1926.
6. Simpson, quoted by Willis.[25]
7. Belz, quoted by Willis.[25]
8. Cary, E.: Chorio-epithelioma; recurrence after three years; invasion of spinal canal; villi in secondary growth, Surg., Gynec. & Obst. *16*:363 (April) 1913.
9. Haler, D. H.: Two further cases of sarcoma associated with known trauma, Brit. M. J. *1*:933 (May 21) 1932.
10. Gallavardin, L., and Varay, F.: Cancer secondair du cerveau, du cervelet, et de la moelle, Rev. de Med. *23*:441, 1903.
11. Roulet, F.: Contribution á l'étude des tumeurs mélaniques, Ann. d'Anat. Path. *6*:489 (May) 1929.
12. Woods, W. W., and Pimenta, A. M.: Intramedullary lesions of spinal cord; study of sixty-eight consecutive cases, Arch. Neurol. & Psychiat. *52*:383 (Nov.) 1944.

13. Frazier, C. H., and Allen, A. R.: Surgery of the Spine and Spinal Cord, New York, D. Appleton and Company, 1918.
14. Kernohan, quoted by Woods and Pimenta.[12]
15. Rasmussen, T. B.; Kernohan, J. W., and Adson, A. W.: Pathological classification with surgical consideration of intraspinal tumors, Ann. Surg. *111:*513 (April) 1940.
16. Pette, quoted by Hofheinz.[2]
17. Seifert, quoted by Hofheinz.[2]
18. Greeves, A. R., and Holmes, G., quoted by Courville and Schillinger.[20]
19. Neame, quoted by Courville and Schillinger.[20]
20. Courville, C. B., and Schillinger, R. J.: Metastatic melanoblastomas of brain; review of literature and survey of eighteen cases, Bull. Los Angeles Neurol. Soc. *4:*8 (March) 1939.
21. Courville, C. B., and Schillinger, R. J., cited in[20]
22. Bailey, P.: Intracranial Tumors, Springfield, Ill., Charles C Thomas, 1933, p. 367.
23. Bonnet, quoted by Courville and Schillinger.[20]
24. Moersch, F. P.; Love, J. G., and Kernohan, J. W.: Melanoma of central nervous system, J.A.M.A. *115:*2148 (Dec. 21) 1940.
25. Willis, R. A.: The Spread of Tumors in the Human Body, London, J. & A. Chirchill, 1933.

THE TREATMENT OF PSEUDOCYSTS OF THE PANCREAS BY INTERNAL DRAINAGE

THOMAS C. MOORE, M.D.
HARRIS B. SHUMACKER, JR., M.D.
Indianapolis, Ind.

THE rarity of pseudocysts of the pancreas renders evaluation of the various methods suggested for their treatment difficult. The majority of the reports encountered in the literature deal with single cases or small series. The largest series have been studied by Judd, Matson, and Mahorner,[10] who reported 47 cases from the Mayo Clinic in 1931 and by Meyer, Sheridan, and Murphy,[15] who reported 31 cases from the Cook County Hospital in 1949.

There is general agreement regarding the desirability of surgical intervention in patients who have pseudocysts of the pancreas. The enlarging intra-abdominal mass may cause considerable discomfort. Furthermore, if untreated these cysts may eventually rupture and spill their contents into the peritoneal cavity, often with disastrous consequences. Death occurred in 4 of the 6 cases of spontaneous rupture reported by Koucky, Beck, and Todd.[12]

Complete excision is preferable when the cyst is sufficiently small and this procedure has been employed from time to time since Bozeman,[2] in 1882, reported the first complete excision of a pseudocyst of the pancreas. Unfortunately the majority of the pseudocysts are so large as to render complete excision technically impossible or unsafe. Excision was thought possible in only 7 of the 47 cases of Judd, Matson, and Mahorner and in but 2 of the 31 cases of Meyer, Sheridan, and Murphy. It should also be emphasized that an unsuccessful attempt at excision carries a prohibitively high mortality.[14]

Whenever the pseudocyst cannot be excised, as is usually the case, some means of draining the cyst must be employed. There is considerable divergence of opinion at the present time concerning the relative merits of internal drainage of the cyst contents into the gastrointestinal tract and external drainage through the abdominal wall by marsupialization. Several recent publications have continued to advise marsupialization as the treatment of choice. Priestley,[19] in 1950, recommended marsupialization in preference to internal drainage. In 1949, Zieman,[21] referring to the methods of internal drainage, stated, "Despite the number of reported successes, the operation appears more as a surgical feat than any of

From the Department of Surgery, Indiana University Medical Center, Indianapolis, Indiana.

practical advantage to the patient." We feel justified, however, in emphasizing the advantages of the Roux-Y cystjejunostomy and wish to report a case of pseudocyst successfully treated by this method.

Case Report

The patient, a 31 year old housewife, entered the hospital on Sept. 15, 1950, with a history of having been involved in a severe auto accident on July 23. She was reported to have been unconscious for 11 days following the accident. She had suffered multiple fractures of ribs, a fracture of the transverse process of D-1, and a fracture of her right humerus with associated radial nerve palsy. Approximately three to four weeks following the accident, she noticed the presence of an abdominal mass which subsequently increased in size. She had had several episodes of nausea and vomiting and, on admission, complained of severe abdominal pain. Her past history was noncontributory.

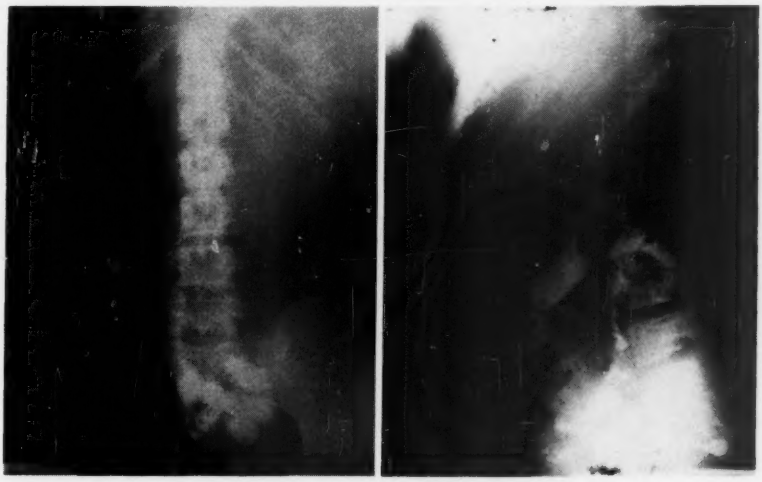

Fig. 1a, 1b. Preoperative roentgenograms.

On physical examination, a large epigastric mass could be palpated. It was relatively immobile and associated with abdominal tenderness. Respiratory excursions were limited voluntarily because of discomfort from her rib injuries. Roentgenographic examination by barium contrast studies showed a large mass displacing the stomach anteriorly and the transverse colon inferiorly (fig. 1a, 1b).

On admission her white blood count was 7,100, red blood count was 3.8 million and hemoglobin was 12 Gm. The urine examination was normal. The blood amylase was 652 mg. reducing sugar per 100 cc. of serum.

The patient was operated upon on October 5. The peritoneal cavity was entered through a left paramedian incision. A large mass was encountered occupying the area behind the stomach and presenting through the gastrocolic ligament (fig. 2a). The mass was felt to be a large pseudocyst of the pancreas. Except for the displacement of the viscera no other abnormalities were found.

A needle was introduced into the cyst and clear, slightly amber colored fluid was aspirated. The jejunum was divided below the ligament of Treitz between Stone clamps and the proximal jejunum was sutured end-to-side into

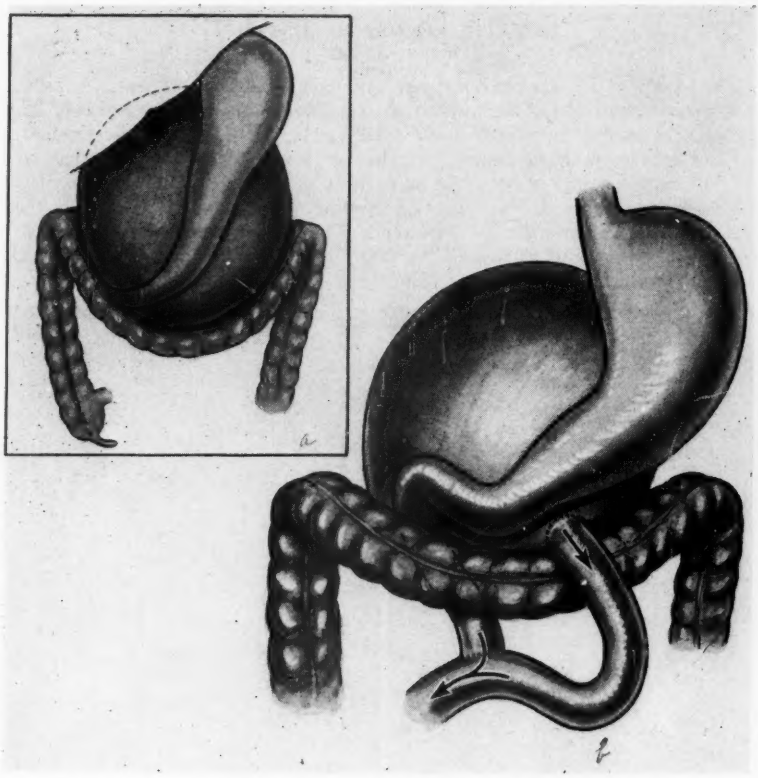

Fig. 2a, 2b. Semidiagrammatic drawing of condition found at operation and procedure carried out.

the distal segment about 18 inches below the point of division. The anastomosis was done over the clamps utilizing the presection mattress technic; two layers of silk suture were used. The cyst was opened and 2000 cc. of fluid were aspirated. The amylase concentration in this fluid was later reported as 1,078 mg. reducing sugar per 100 cc. of fluid. The cyst was single and its wall collapsed well after aspiration of its contents. Using the same technic, the divided end of the jejunum was then implanted into the cyst wall in an antecolic fashion (fig. 2b). A good stoma was palpable at both anastomoses. The wound was closed in layers with interrupted silk sutures.

The patient's postoperative course was completely uneventful. A serum amylase determination on October 11 was 137. She was discharged symptomless on October 14, with a well healed wound and a flat abdomen.

Gastrointestinal studies on October 30 revealed a decrease in the size of

the cyst and on December 5 the barium studies were within normal limits (fig. 3a, 3b). At no time during these examinations did barium enter either the Roux-Y limb or the pseudocyst. Serum amylase determinations were 103

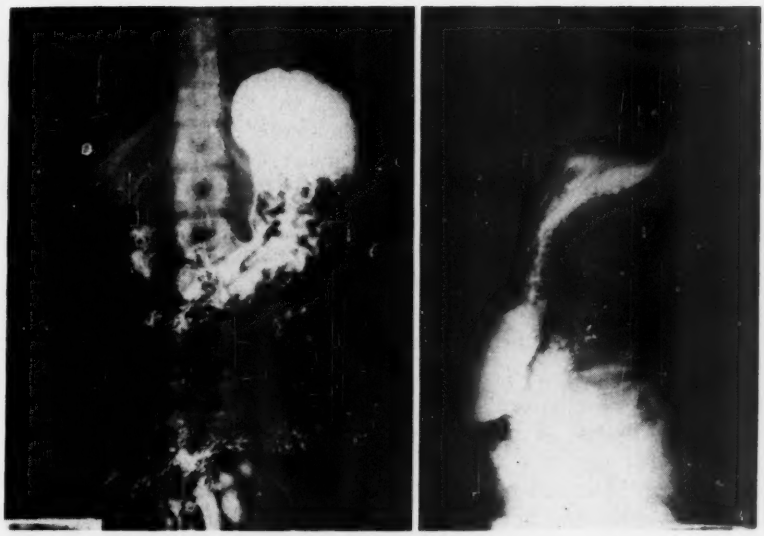

Fig. 3a, 3b. Postoperative roentgenograms.

on November 11 and 69 on December 5. Except for one brief episode of nausea and vomiting on November 11, she has been symptom free.

Discussion

The oldest and still the most frequently employed method of treating the larger pancreatic pseudocysts is marsupialization as suggested by Gussenbauer[7] in 1883. Marsupialization was carried out in 33 of the 47 cases of Judd, Matson and Mahorner and in 25 of the 31 cases of Meyer, Sheridan, and Murphy. There was a mortality of 4.8 per cent from marsupialization in 21 unruptured pseudocysts reported by Meyer and his associates. The morbidity from marsupialization has been much higher and many objections have been raised to its use. Persistent fistulous drainage of cyst contents upon the abdominal wall with resultant excoriation can be quite troublesome. Premature closure of fistulous tracts has often resulted in the reformation of the cyst and the necessity for further operative procedures. Not infrequently over a long period of time there occurs intermittent cessation of drainage, each episode being associated with pain and apparent redistension of the cyst. In a few instances chronic fistulous tracts have been treated by implantation into the jejunum with good results.[1]

The obvious theoretical advantages of a safe and efficient method of internal drainage have led a few surgeons to explore the possibilities of anastomosing the pseudocyst to various segments of the adjacent gastrointestinal tract. The first attempt to secure internal drainage was reported in 1921 by Jedlicka,[9] who anastomosed the cyst to the stomach. Cystgastrostomy has enjoyed its greatest popularity in a number of Czech clinics and the results of Jurasz and others have been ably reviewed in the recent literature by Kunc[13] and Brandenburg, Maddock, and Schweitzer.[3] Brandenburg and his associates, found only one death in 27 cases of cystgastrostomy including 25 from the literature and 2 of their own.

Walzel,[20] in 1927, and Neuffer,[17] in 1939, advocated the use of internal drainage by means of cystcholecystostomy while Kerschner[11] recommended cystduodenostomy. The results from these two procedures have not been sufficiently encouraging to warrant their continued use.[5]

On purely mechanical grounds, the jejunum is the most ideally situated segment of the gastrointestinal tract from position and mobility for use in securing the most dependent drainage of the pseudocyst. Dependent drainage is important since the cyst wall has no contractible power. The first successful use of the jejunum for internal drainage was reported in 1927 by Hahn.[8] Subsequently, Chesterman[4] and Poer and Stephenson[18] added to the literature single cases of successful loop cystjejunostomy. Griessmann[5] in 1948 reported an additional successful loop cystjejunostomy and reviewed 5 similar cases from the Germanic literature reported by Krasnoselskij (2 cases), Blinow, Kafka, and Konig. Meyer and his associates utilized cystjejunostomy in 2 patients, both of whom died from infection 4 and 10 weeks after operation. In one of the patients, barium given by mouth was demonstrated by radiologic examination to enter the cyst from the jejunum.

To avoid the possibility of infection secondary to gross contamination of the cyst by intestinal contents, Adams and Nishijima[1] in 1946 described the use of a modification of cystjejunostomy in which they performed a lateral jejunojejunostomy between the afferent and efferent loops approximately 20 cm. from the cystjejunostomy. In 1948, 3 single case reports of successful cystjejunostomy utilizing the Roux-Y principle were published almost simultaneously by Gurwitz and Hurwitz,[6] Migliaccio and Laurelli,[16] and Griessmann.[5] An antecolic anastomosis with a 6 cm. Roux-Y limb was used by Gurwitz and Hurwitz, while both Griessmann and Migliaccio and Laurelli performed retrocolic anastomoses with 6 inch Roux-Y limbs. The utilization of the Roux-Y jejunal limb combines the most satisfactory means of dependent cyst drainage with

a minimal risk of infection from regurgitation of intestinal contents into the pseudocyst.

The pessimism of Meyer and his associates concerning cystjejunostomy resulting from the death of both their patients has not been shared by other authors who have described their experiences with this method. In addition to the 2 fatal cases of Meyer and his associates, 14 other cases of cystjejunostomy, including our own, have been reported without mortality. Nine were loop cystjejunostomies, in one a loop cystjejunostomy was performed with a proximal diverting entero-enterostomy, and in 4 cases the anastomosis between the pseudocyst and jejunum was effected by means of a Roux-Y limb. It would seem clear that use of the Roux-Y limb should add considerably to the safety of cystjejunostomy.

Summary

1. The literature concerning the surgical treatment of pseudocyst of the pancreas has been briefly reviewed with emphasis upon the methods for obtaining internal drainage of the cyst into the gastrointestinal tract.

2. A case of post-traumatic pseudocyst of the pancreas treated successfully by Roux-Y cystjejunostomy is presented.

3. Roux-Y cystjejunostomy is recommended as an ideal means of achieving optimum drainage of pseudocysts with minimum risk of infection.

Addendum

Since this paper was submitted for publication, Poer and Whitaker (*Ann. Surg., 133:*746, 1951) have reported a case of pseudocyst of the pancreas successfully treated by Roux-Y cystjejunostomy and, in the discussion of their paper, Cole and Reynolds each added a single successful case of Roux-Y cystjejunostomy. We have recently treated a second case by Roux-Y cystjejunostomy with disappearance of all evidence of the cyst. These cases bring to 8 the reported instances in which cystjejunostomy to a Roux-Y limb has been successfully carried out.

REFERENCES

1. Adams, R., and Nishijima, A.: Surgical treatment of pancreatic cysts, Surg., Gynec. & Obst. *83:*181 (Aug.) 1946.
2. Bozeman, N.: Removal of cyst of pancreas weighing twenty and one-half pounds, M. Rec. *21:*46 (Jan. 14) 1882.
3. Brandenburg, F. H.; Maddock, S., and Schweitzer, R. J.: Cystogastrostomy; treatment of pancreatic pseudocysts, Ann. Surg. *133:*219, 1951.
4. Chesterman, J. T.: Treatment of pancreatic cysts, Brit. J. Surg. *30:*234 (Jan.) 1943.
5. Griesmann, H.: Zur behandlung der Pankreascysten, Chirurg. *19:*302, 1948.

6. Gurwitz, J., and Hurwitz, A.: Treatment of pancreatic cysts, Ann. Surg. *128:*976 (Nov.) 1948.
7. Gussenbauer, C.: Zur operativen behandlung der Pankreascysten, Arch. f. Klin. Chir. *29:*355, 1883.
8. Hahn, O.: Beitrag zur behandlung der Pankreascysten, Zentralbl. f. Chir. *54:*585 (March 5) 1927.
9. Jedlicka, R.: Eine neue Operationsmethode der Pankreascysten (Pancreatogastrostomie) (Rohzledy v Chir. a gyneekol. I. Hft. 3. 1921), Znetralbl. f. Chir. *50:*132, 1923.
10. Judd, E. S.; Mattson, H., and Mahorner, H. R.: Pancreatic cysts, Arch. Surg. *22:*838 (May) 1931.
11. Kerschner, F.: Transduodenale Anastomosierung einer Pankreascyste mit dem Duodenum, Beitr. z. Klin. Chir. *147:*28, 1929.
12. Koucky, J. D.; Beck, W. C., and Todd, M. C.: Perforation of pancreatic cysts; report of six cases, Surg., Gynec. & Obst. *73:*113 (July) 1941.
13. Kunc, Z.: Direct anastomosis between pancreatic cyst and intestinal tract, J. Internat. Coll. Surgeons *10:*529 (Sept.-Oct.) 1947.
14. Maingot, R.: Abdominal Operations, New York, D. Appleton-Century Company, 1940.
15. Meyer, K. A.; Sheridan, A. I., and Murphy, R. F.: Pseudocysts of pancreas, Surg., Gynec. & Obst. *88:*219 (Feb.) 1949.
16. Migliaccio, A. V., and Laurelli, E. C.: Pancreatic cyst; internal drainage utilizing Roux principle, Surgery *24:*54, 1948.
17. Neuffer, H.: Zur Frage der Pankreatocystanastomosen und deren Dauererfolge, Chirurg. *11:*194 (March 15) 1939.
18. Poer, D. H., and Stephenson, R. H.: Late results in treatment of pancreatic cysts by internal drainage, Surg., Gynec. & Obst. *89:*257 (Sept.) 1949.
19. Priestley, J. T.: Surgical lesions of pancreas, S. Clin. North America *30:*971 (Aug.) 1950.
20. Walzel, P.: Innere Drainage einer Pankreascyste unter Ausnutzung des Resorptionsvermögens der Gallenblase, Mitt. a.d. Grenzgeb. d. Med. u. Chir. *40:*171, 1927.
21. Zieman, S. A.: Cystic omental bursa: pseudopancreatic cyst, J. Internat. Coll. Surgeons *12:*150 (March-April) 1949.

MALIGNANT TUMORS OF THE THYROID

N. S. SHOFNER, M.D.
Nashville, Tenn.

THIS paper is a report of 42 cases of malignant tumors of the thyroid encountered in 1,578 private patients upon whom I have performed thyroidectomy at St. Thomas Hospital, in Nashville, from 1930 to 1950 inclusive, a period of 21 years. During this period I have had private patients at Vanderbilt Hospital, Baptist Hospital and Nashville General Hospital, but the vast majority of my cases have been at St. Thomas and time has not been available to review those at the three other hospitals.

All the tissue of these 42 cases has been restudied recently by Dr. D. K. Gotwald, pathologist at St. Thomas Hospital, and I am indebted to him for his review of this tissue and his classification of the tumors according to Dr. Shields Warren.

This classification is as follows:

Benign:

1. Adenoma
    a. Embryonal
    b. "Fetal"
    c. Hurthle cell
    d. Papillary cystadenoma

Malignant:

1. Low to Moderate Malignancy
    a. Adenoma with blood vessel invasion (malignant adenoma)
    b. Papillary cystadenocarcinoma (including "lateral aberrant thyroid")
    c. Alveolar carcinoma
    d. Hurthle cell carcinoma
2. Highly Malignant
    a. Anaplastic (small cell) carcinoma
    b. Giant cell carcinoma
    c. Squamous cell carcinoma
    d. Sarcoma (?)

All of these patients have been traced except one who was operated upon four years ago for papillary cystadenocarcinoma while living temporarily in Nashville and who has never reported in person or by letter since her immediate convalescence.

Presented during the Hollywood Assembly of The Southeastern Surgical Congress, Hollywood, Fla., April 11-14, 1951.

Of the 1,578 thyroidectomies in this series there were 42 malignant tumors, making the percentage of malignancies 2.66 of all cases. There were 917 cases of nodular goiter of which 176 were toxic and 741 nontoxic. There were no definite cases of toxic goiter in this series of malignancies, and all the cases of malignancy occurred in nontoxic nodular goiters, making a percentage of 5.9 of malignancy in all nontoxic nodular goiters. George Crile, Jr., *et al.* report a series of cases from Cleveland Clinic in which 10.9 per cent of all surgically removed nontoxic nodular goiters were malignant and they state further that 24.5 per cent of nontoxic solitary nodules were malignant. Warren H. Cole, *et al.* report 17.15 per cent of malignancy in all nontoxic nodular goiters and 24.8 per cent in solitary nodules. Lahey and Hare report an incidence of 10.04 per cent of malignancies in discrete adenomas.

Unfortunately not all the records of the present series distinguished between solitary and multinodular nontoxic goiters but there is no doubt in the writer's mind that malignancy occurs far more frequently in the solitary nodule than in the multinodular goiter.

McSwain and Dively quote Allen Graham to the effect that 92.4 per cent of cancers of the thyroid originate in adenomas but they question this opinion.

Cole believes that carcinoma usually develops in a pre-existing nodule or adenoma and cites as evidence the fact that the average duration of the nodule in his series is six years preoperatively. Lahey supports this view.

Crile, on the other hand, says that although the incidence of carcinoma is higher in nodular goiters it is difficult to prove that carcinomas have their origin in benign adenomas, and that it is reasonable to suppose that many, if not most, carcinomas of the thyroid are carcinomas from the beginning and arise from the parenchyma of the thyroid as do benign adenomas.

I am not prepared to give the answer to this question but it has been my experience as well as that of many others that most cancers of the thyroid are found in nodular goiters and especially in the solitary nodules.

It seems pretty generally agreed by writers on this subject that all discrete nodules of the thyroid should be removed for fear of malignancy. Crile, who warns against basing one's decision to operate upon statistics alone, sets up the following criteria:

1. An enlarging adenoma.

2. An adenoma which is firm and of different consistency from surrounding tissue.
3. An adenoma giving pressure symptoms.
4. A conspicuous adenoma for cosmetic reasons.
5. All adenomas in children.

I have endeavored to condense most of the pertinent facts in this series of cases by making a few tables. In this series there were only two males, one a boy of 9 years with papillary cystadenocarcinoma of the thyroid and metastases to the glands of the neck, and a man of 71 years with giant cell carcinoma which could not be removed. This small number of males is in marked contrast to the report of Cole, who states that carcinoma is three times as likely to develop in men with nontoxic nodular goiter as in women.

I have not averaged the ages of the patients but the youngest was a girl of 7 and the oldest a woman of 76.

Knowledge of the presence of the goiter, according to the histories, varied from 2 days to 40 years. Some of the statements show a remarkable lack of observation; for instance, there was one patient who had noticed the goiter only a week before examination, but who had a tumor mass as large as a lemon and who had been short of breath for four years.

TABLE 1

5 Years or More Postoperative

Age	Total cases	Patients alive	Patients dead	No follow-up
7	1	1	0	
9	1	1	0	
10-20	2	2	0	
20-30	1	1	0	
30-40	2	2	0	
40-50	3	3	0	
50-60	4	2 (1 with recurrence)	1	1
60-70	6	1	5	
70-80	5	1	4	
	25	14	10	1
10 below 50 years		10		
15 above 50 years		3 (apparently well) 1 (with recurrence)	10	1 untraced

58.33 per cent of those traced living 5 years or more.

TABLE 2

Less Than 5 Years Postoperative

Age	Total cases	Patients alive	Patients dead	No follow-up
9	1	1	0	
10-20	1	1	0	
20-30	3	3	0	
30-40	4	4	0	
40-50	3	2	1	
50-60	2	2	0	
60-70	2	0	2	
70-80	1	0	1	
	17	13	4	
12 below 50 years		11	1	
5 above 50 years		2	3	

TABLE 3

Malignant Ademona

Case No.	Complete removal	Confined to Thyroid	X-ray treatment	Result	Interval
2	no	no	yes	dead	13 yrs.
7	no	no	yes	dead	18 mos.
9	yes	yes	no	alive	8 yrs. 7 mos.
12	yes	yes	no	alive	7 yrs. 3 mos.
13	yes	yes	yes	alive	7 yrs. 5 mos.
22	yes	yes	no	alive recurrence	5 yrs.
23	yes	yes	yes	alive	5 yrs.
Papillary Cystadenocarcinoma and Including Latent Aberrant Thyroid					
4	no	no	no	dead	12 days
6	yes	yes	no	alive	9 yrs. 4 mos.
8	yes	yes	no	alive	9 yrs.
10	yes	no (gland)	yes	alive	8 yrs. 7 mos.
11	yes	yes	yes	alive	8 yrs. 7 mos.
16	yes	yes	yes	alive	7 yrs. 10 mos.
18	yes	no (aberrant	no	alive	6 yrs. 6 mos.
19	yes	yes	no	no follow up	5 yrs.
21	yes	yes (sublingual)	yes	alive	5 yrs.

TABLE 3 (*continued*)

Case No.	Complete removal	Confined to Thyroid	X-ray treatment	Result	Interval
24	no	no	yes	dead	4 mos.
25	yes	yes	yes	alive	4 yrs. 8 mos.
26	yes	yes	no	alive	3 yrs. 9 mos.
27	no	no	yes	alive	3 yrs. 9 mos.
29	no	no	yes	alive	3 yrs. 6 mos.
30	yes	yes	no	alive	3 yrs. 6 mos.
32	yes	yes	yes	alive	2 yrs.
33	no	no	yes	alive	1 yr. 11 mos.
35	no	no	yes	alive	2 yrs.
36	yes	yes	no	alive	1 yr. 10 mos.
37	yes	yes	no	alive	1 yr. 8 mos.
38	yes	yes	no	alive	1 yr. 6 mos.
41	no	no	yes	alive	1 yr.
			Alvealor Carcinoma		
1	yes	yes	no	alive	19 yrs. 8 mos.
28	no	no	yes	dead	5 mos.
			Hurthle Cell Carcinoma		
20	yes	no	no	dead	2 yrs. ?
31	yes	no	no	alive	2 yrs. 8 mos.
42	yes	yes	no	alive	5 mos.
			Anaplastic (small cell) Carcinoma		
14	no	no	no	dead	2 wks.
15	no	no	yes	dead	6 mos.
34	no	no	yes	dead	5 mos.
			Giant Cell Carcinoma		
5	yes	yes	yes	dead	9 yrs.
17	no	no	yes	dead	1 yr.
39	no	no	no	dead	1 mo.
40	no	no	yes	dead	8 mos.
			Sarcoma		
3	no	no	yes	dead	6 mos.

Table 1 summarizes the 25 cases operated upon five years or more ago, according to age group. It will be seen that of 10 patients below 50 years of age at the time of operation all are living. Of 15 patients above 50 years only 3 are living and apparently well, 1 is living with extensive metastases, 10 are dead and 1 untraced.

Table 2 summarizes the 17 cases operated upon less than five

years ago. Of the 12 cases below 50 years, 11 are living and 1 is dead. Of the 5 cases above 50 years, 2 are living and 3 are dead. Of course the normal life expectancy is greater below 50 years than beyond 50 years but there are other factors here. First, the majority of the younger patients had a more benign type of cancer. Second, and also important, the tumor had existed longer in the older patients and in several cases tumors which were relatively benign from a histological point of view had invaded the trachea and surrounding soft tissues so extensively that a satisfactory operation could not be done.

Table 3 lists the cases according to type of malignancy, the completeness of the operation, whether or not confined to the thyroid, x-ray treatment, the results and the interval since operation. All cases are listed regardless of the interval since operation. It is realized that statistics on living patients less than five years postoperatively are meaningless, but the deaths which occur before five years have elapsed are interesting, particularly in relation to the type of pathology.

It will be observed that out of 7 malignant adenomas, 4 are living and well for more than five years, 1 is living with extensive metastases, 1 died of cancer after 13 years and 1 died in 18 months.

The patient who lived only 18 months was a woman 69 years old who had had a nodular goiter for 25 years which had been growing and producing pressure symptoms for two years. The specimen weighed 175 Gm. and it was adherent to the trachea and muscles.

Out of 22 cases of papillary cystadenocarcinoma, 19 are living and apparently well and 1 has not been traced. Six of those living were operated upon more than five years ago. Two of these cases are dead. One died in the hospital 12 days postoperatively. She was a woman 76 years old, who had had a nodular goiter for 20 years. It had been growing rapidly for seven weeks and had produced hoarseness and respiratory embarrassment and dysphagia for three weeks. This patient was admitted to the hospital as an emergency case and sent to the operating room for tracheotomy. Only enough thyroid tissue was removed to uncover the trachea and to permit a biopsy. The tracheotomy relieved the respiratory distress but she developed pneumonia and died on the twelfth postoperative day.

The second case of papillary cystadenocarcinoma who died was a woman 60 years old who had had a nodule in the thyroid for 13 years and whom I had examined five years before she came to operation. At that time she had a solitary nodule in the left lobe of the thyroid which was very firm and somewhat fixed and which led me

to suspect carcinoma. She refused operation at that time and when I saw her again five years later the left lobe and isthmus were involved in a large mass which, at operation, was found invading the trachea and soft parts and which could not be completely removed. She died of bony and pulmonary metastases in four months.

In the group of papillary cystadenocarcinoma there were two sublingual goiters. One was a young woman of 16, operated upon five years ago. The other was a woman of 59 who was operated upon one year ago. Both received x-ray therapy and both are living and apparently well.

There were only 2 cases of alveolar carcinoma. One was a little girl of 7 who is living and apparently well after 19 years. The other was a woman of 46 who is dead. She had had a nodular goiter for about 10 years, which had grown rapidly for six months and produced pressure symptoms and pain in the neck. The right lobe and isthmus were involved in a large nodule which was firm and fixed and tender leading to a preoperative diagnosis of nontoxic nodular goiter with thyroiditis, with carcinoma a possibility. At operation the tumor was so fixed to the trachea and muscles that it could not be removed completely by any means. She was given x-ray therapy but did not improve and she died in about one year.

There were 3 cases of Hurthle cell carcinoma. Two are living and apparently well, one after nearly three years and one after five months. One is dead. She was a woman of 72 upon whom I operated in 1945 and upon whom I considered a very satisfactory operation had been done. She died approximately two years after operation of a respiratory infection and showed no evidence of recurrence of the thyroid tumor.

There were 3 cases of anaplastic or small cell carcinoma. All are dead. They were all women and their ages were 65, 66 and 75. One had had a nodule for 40 years, one for two years and one for one and one-half years. They had all grown rapidly in recent months and none could be completely removed. Two received x-ray therapy and one did not. One lived only a few weeks, one lived five months and one six months postoperatively.

There were 4 cases of giant cell carcinoma, all of whom are dead. Three were women aged 62, 71, 67 respectively. One was a man of 71 years. One woman of 62 had had a solitary nodule for eight or nine years which had grown rapidly for one month. An apparently complete excision of the tumor was done and x-ray therapy was given. This operation was done in November 1941 and the patient lived until Jan. 5, 1951, nearly 10 years. Her death was due to a broken hip and pneumonia and she showed no evidence of recurrence

of the cancer. One woman of 71 had had a solitary nodule for 15 or 20 years which had not grown much until nine months ago when it began to grow rapidly. She had an ulcerating mass involving the thyroid, muscles and skin. It could not be completely excised. She was given x-ray therapy but died in less than a year.

One woman of 66 had had a steadily growing solitary nodule for one and one-half years, which had produced dyspnea and dysphagia for several weeks. At operation the tumor was invading the trachea and could not be completely removed. She was given x-ray therapy and did fairly well for a few months but five months later developed marked respiratory distress and was sent from her home, a distance of 80 miles, back to the hospital. Upon admission she was gasping for breath and cyanotic and was sent directly to surgery for tracheotomy. Respiration had ceased upon arrival at surgery and tracheotomy and artificial respiration were unavailing. The lumen of the trachea grossly appeared to be invaded by carcinoma but a satisfactory specimen was not obtained for biopsy.

The only man was 71 years old and senile. He stated that he had noticed the goiter for only one week but he had been dyspneic for three or four years. The right lobe of the thyroid was represented by a solitary nodule the size of a lemon which could not be completely removed. He did not have x-ray therapy and lived one month.

There were no cases of squamous cell carcinoma in this series.

There was one case of fibrosarcoma. She was a woman of 63 who was operated upon in 1937. She had had a goiter for 25 years which had never given symptoms until three weeks before admission when it began enlarging rapidly and produced dyspnea and pain in the shoulders and in the left neck and ear.

The tumor mass was in the left lobe and was very hard and fixed and densely adherent to the surrounding structures. A fairly complete removal was done and the specimen measured 9 by 7 cm. She was given x-ray therapy but died in six months.

It is seen in table 3 that 23 patients received postoperative therapy for all types of malignancy. Nineteen patients received no postoperative therapy. In general those patients in whom the tumor was of a low grade malignancy and in whom it appeared that the tumor was confined to the thyroid and was completely removed, no x-ray was given. In a few patients who were almost moribund at the time of operation no x-ray was given. In those where there was any doubt about the completeness of the operation, x-ray therapy was advised. There may be some doubt about what the x-ray contributed to the recovery of some of the patients but there is one case

in this series about which there can be no doubt. This is the case of a little boy of 9 who was operated upon on Oct. 22, 1947, for papillary cystadenocarcinoma which had produced a large tumor of the thyroid and had metastasized to the lymph glands of both sides of the neck. The thyroid was so fixed to the trachea and muscles that it could not be romoved and only part of the lymph glands were removed. He was given x-ray therapy and is living and apparently well three and one-half years postoperatively. The enlarged lymph glands have completely disappeared and there is only a slight thickening of the thyroid. I am not prepared to say that this child is cured but I am convinced that this otherwise hopeless case has shown remarkable response to x-ray therapy and I have considerable hope for his future.

None of these cases had a radical neck dissection although 2 cases which had enlarged cervical lymph glands had these glands removed. Both were cases of papillary cystadenocarcinoma. Many surgeons have recommended radical neck dissection in malignancy of the thyroid, especially in the more malignant types. In my own cases where the cancer has been of a high grade of malignancy or where it has been very extensive there have also been dense adhesions to the trachea suggesting invasion and in a few cases it was obvious that shreds of malignant tissue were left attached to the trachea. Since it is obviously impractical to remove the trachea it seems illogical to do a radical dissection for removal of possibly malignant lymph glands when known malignant tissue is left behind. It has been my practice to remove the tumor of the thyroid as completely as possible and to remove all suspected lymph glands and then give x-ray therapy to both sides of the neck.

TABLE 4

Type of Tumor	*Number of Patients*			
	Total	Patients alive	Patients dead	No follow-up
Malignant adenoma	7	5 (1 recurrence)	2	
Papillary cystadenocarcinoma	22	19	2	1
Alveolar carcinoma	2	1	1	
Hurthle cell carcinoma	3	2	1	
Anaplastic (sm. cell) carcinoma	3		3	
Giant cell carcinoma	4		4	
Squamous cell carcinoma	0			
Sarcoma	1		1	
	42	27	14	1

In summary, 42 cases of malignancy of the thyroid have been reviewed. This represents 2.66 per cent of 1,578 thyroidectomies for all types of thyroid disease and 5.9 per cent of 741 cases of nontoxic nodular goiter.

Of 25 cases of five years or more postoperative, 14 are living of which 1 has metastases, 10 are dead, and 1 untraced.

Of 17 cases less than five years postoperative, 13 are living and 4 dead.

Of the 25 cases of five years or more postoperative, 10 were below 50 years of age at the time of operation and all are living. Fifteen were over 50 years of age and of these 3 are living and apparently well. Ten are dead. One is living with recurrence and 1 is untraced.

There were 17 cases operated upon less than five years ago. Of these 12 were below 50 years of age and all are living except 1. Five were above 50 years of age. Of these 2 are living and 3 are dead.

By far the most frequent tumor in this series was the papillary cystadenocarcinoma, 22 out of 42, and fortunately this group has the highest survival rate.

All cases of giant cell carcinoma and small cell carcinoma are dead and the 1 case of fibrosarcoma is dead.

Two of the cases of cystadenocarcinoma of the thyroid occurred in the only 2 cases of sublingual goiter in this series.

X-ray therapy was given in most cases in which it was known or believed that an incomplete operation was done and in 1 case was the only therapy given to a boy of 9 who is living and apparently well after three and one-half years.

Conclusions

1. Malignancy of the thyroid is fairly common in nontoxic nodular goiters, 5.9 per cent in this series.

2. Malignancy in the thyroid occurs in all ages—childhood to old age.

3. Carcinoma of the thyroid appears to be more fatal in older people than in younger people. It is believed that this is true not only because the more highly malignant tumors are more frequent in older people but because even the less malignant tumors have existed longer and have invaded surrounding tissues.

4. All discrete nodules of the thyroid should be removed because of the suspicion of malignancy.

5. All sublingual goiters should be removed because of danger of malignancy.

6. X-ray therapy is a valuable adjunct of surgery in the treatment of carcinoma of the thyroid.

7. Radical neck dissection is not, in most instances, a necessary or logical procedure in malignancy of the thyroid.

8. The outlook for cure in malignancy of the thyroid is good if the tumor is removed early.

REFERENCES

1. Warren, S.: Classification of tumors of thyroid, Am. J. Roentgenol. *46:*447 (Oct.) 1941.
2. Crile, G., Jr., and Dempsey, W. S.: Indications for removal of nontoxic nodular goiters, J.A.M.A. *139:*1247 (April 30) 1949.
3. Cole, W. H.; Slaughter, D. P., and Majarakis, J. D.: Carcinoma of thyroid gland, Surg., Gynec. & Obst. *89:*349 (Sept.) 1949.
4. Lahey, F. H., and Hare, H. F.: Malignancy in adenomas of thyroid, J.A.M.A. *145:*689 (March 10) 1951.

TRAINING COURSES FOR AMBULANCE DRIVERS*

C. C. HOWARD, M.D.
Glasgow, Ky.

Mr. Chairman, Ladies and Gentlemen:

For only a few moments I wish to bring to your attention some of the tragic results of the many accidents occurring daily in our country.

With our modern inventions (the Machine Age) injury and death have multiplied manyfold.

The medical profession has been on the receiving end of this constant stream of accident victims. The ambulance is usually the first to be called to the scene of accident; then the doctor at his office or a hospital takes over to mend a broken body, or surrender to the funeral director at the end of the street. Thus, the medical and nursing professions start at the end of the line to administer unselfishly.

Let us, as a profession, go up to the headwaters of this accident stream, offer our sincere suggestions, and join hands with other organizations to prevent many of these tragedies.

The following illustrations obtained from the National Safety Council are presented to remind you that such accidents as these are happening daily in your community and many of them could be prevented.

Fig. 1.
Grade crossing, 1949
1609 killed.

*Presidential address presented during the Hollywood Assembly of The Southeastern Surgical Congress, Hollywood, Fla., April 11-14, 1951.

Figure 1 is self-explanatory. Legislation by each state to make railroad crossings safe could have saved these 1,609 citizens.

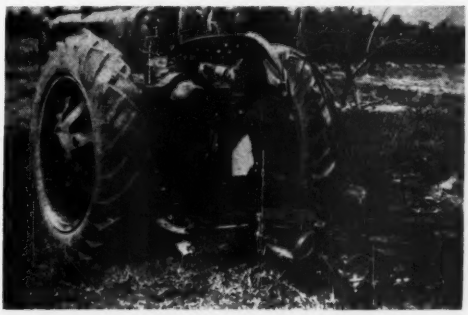

Fig. 2.
Farm accidents, 1949
Total deaths, 17,000
Number injured, 1,650,000.

The machine age has added to the fatal and nonfatal accidents on the farm. Education through the schools and Farm Bureau will save many of these people.

Fig. 3.
Industrial accidents, 1949
Deaths, 15,000
Injured, 1,850,000.

Industry has put forth quite an effort to protect its personnel. This should be commended and assisted in every possible way.

Fig. 4.
School child accidents, 1949
Deaths children 5-14 years old, 5,500
Injured in motor vehicle accidents, 5-14 years, 120,000
Motor vehicle accidents,
Deaths 31,500, Injured 1,100,000.

The saddest tragedy of all the accidents is the killing and maiming of our children. Here is a great opportunity for the schools to teach the child how to live in this modern age. They should have a definite course in school in prevention of accidents.

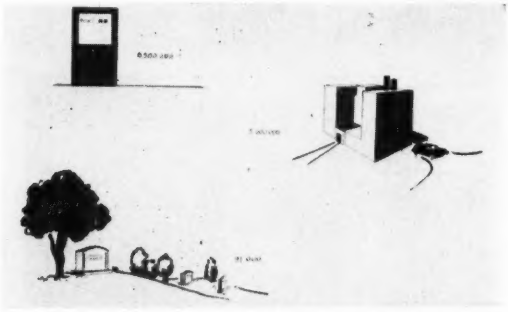

Fig. 5.
Your neighbors, 1949
Killed 91,000
Injured 9,500,000
Total cost, $7,500,000,000.

This figure shows the grand total of accidents in 1949.

SUMMARY

1. Railroad crossings could be made safe through state legislation.

2. Each and every school, college, and university should have a definite course in prevention of accidents by television.

3. It is recommended that The Southeastern Surgical Congress set up a plan for volunteer training of ambulance drivers, school bus drivers, firemen, and others; each state carrying out this program by districts. West Virginia, under the leadership of Dr. E. L. Gage, has already set up a state program.

Note: This is the shortest paper ever presented by a president of The Southeastern Surgical Congress as a presidential address. Its importance, however, can not be measured by its length.—Mg. Ed.

ACUTE INTESTINAL OBSTRUCTION IN INFANTS AND YOUNG CHILDREN

MARSHALL L. MICHEL, JR., M.D.*
MARION LEE JARRELL, M.D.*
New Orleans, La.

THE mortality of acute intestinal obstruction in children, although it has improved considerably in recent years, is still a great deal higher than it should be. There is usually no difficulty, however, in explaining most of the fatalities. Some deaths occur, it is true, because of the inherent seriousness of the pathologic process, but even more occur because diagnosis is delayed, and treatment, as a result, is instituted late, or because diagnosis is not made at all ante mortem and no treatment at all is instituted. There are two chief reasons for this extremely unfortunate situation:

1. The general impression prevails that acte intestinal obstruction is preëminently a disease of adult life, although actually it occurs in children with such frequency that general practitioners, pediatricians, internists and surgeons should constantly bear it in mind as a diagnostic possibility.

2. When the condition is recognized, it is not always realized that certain modifications of therapy and certain special precautions are required because the child, as a number of observers have emphasized, is an individual in his own right, not a small edition of an adult.

All of these errors and misconceptions are apparent in the series of 123 acute intestinal obstructions in infants and children through the twelfth year of life which form the basis of these remarks. These patients were observed between 1946 and 1950, inclusive, at Charity Hospital of Louisiana at New Orleans, where 103 cases were handled, and at Touro Infirmary in the same city, where 20 cases were handled. Eighty-seven of the Charity Hospital patients were Negroes. Touro Infirmary accepts only white patients. There were 26 deaths in the 123 cases, 23 at Charity Hospital, of which 18 occurred in Negro patients, and 3 at Touro Infirmary.

This series includes all types of acute intestinal obstruction in infants and children observed at these two institutions over the period in question with the exception of congenital hypertrophic pyloric stenosis and atresia of the anus and rectum. These two

*From the Department of Surgery, Tulane University of Louisiana School of Medicine, New Orleans.

Presented during the Hollywood Assembly of The Southeastern Surgical Congress, Hollywood, Fla., April 11-14, 1951.

lesions are also obstructing gastrointestinal phenomena, but they represent such highly specialized conditions that they are best discussed as separate entities rather than under the general heading of intestinal obstruction.

The discussion of acute intestinal obstruction in children is simplified by one fact, that with the single exception of intussusception, obstruction of the colon almost never occurs in this age group. Absence of colic involvement is one of the principal differences between intestinal obstruction in youth and in adult life. In 580 cases of acute intestinal obstruction representing all age groups which were treated at the New Orleans Charity Hospital over the three year period ending in 1946, the ratio of small bowel to large bowel obstruction was 1 :5-6. In the 123 cases in children which are under discussion in this contribution the ratio was in the neighborhood of 1:11, and in all 11 instances of large bowel obstruction were colocolic intussusceptions.

The second outstanding difference between acute intestinal obstruction in the child and in the adult lies in the etiologic factors. Except for external hernia, which is important in all reported series in all age groups, the factors responsible for the disease in adults are not prominent, or are not evident at all, in infants and young children, and vice-versa.

TABLE 1

Etiologic Factors and Case Fatality Rates in 123 Acute Intestinal Obstructions in Children 1-12 Years of Age

Cause	Cases		Deaths	
	Number	Proportion	Number	Rates
Intussusception	48	39.1%	7	14.6%
External hernia	24	19.5%	2	8.3%
Atresia	16	13.0%	12	75.0%
Postoperaive adhesions	12	9.4%	1	8.3%
Malrotation	9	7.3%	1	11.1%
Stenosis	3	2.4%	2	66.6%
Ascariasis	3	2.4%		
Duplication	2	1.7%		
Miscellaneous	6	5.0%	1	16.6%
Total	123	100.0%	26	21.1%

The largest single group of obstructions in this series (table 1) consisted of 48 intussusceptions. Fifty-four other cases were of congenital origin, including external hernia, atresia and stenosis, and malrotation and duplication of the intestine. Twelve obstructions were caused by postoperative adhesions, and 3 by boluses of

ascarides. The remaining cases were single instances of various conditions.

Intussusception

Intussusception, as already pointed out, is almost the only cause of obstruction of the colon in children. It is also responsible for the largest number of obstructions of the small bowel in this age group. The 48 instances included in these 123 acute obstructions represent 39 per cent of the total number of cases, 43 per cent of the 112 obstructions of the small bowel, and 100 per cent of the large bowel obstructions. These proportions are in contrast to the incidence of intussusception in a series of 258 acute intestinal obstructions in all age groups recently analyzed from Charity Hospital and Touro Infirmary. In that series intussusception accounted for only 8 per cent of the small bowel obstructions and for only 5 per cent of the large bowel obstructions.

As is usually true, the intussusception in the children's series was primary in the great majority of cases, that is, there was no mechanical reason for its occurrence, while in adults it is practically always secondary, that is, it is precipitated by some underlying pathologic process in the bowel wall. The 6 cases of secondary obstruction in this series were variously accounted for by adenomatous polyps in 3 cases (2 in the ileum and 1 in the colon), and by a hemangioma, a simple serous cyst of the ileum, and a Meckel's diverticulum in 1 case each. The polypoid carcinoma of the colon which is responsible for the majority of colocolic intussusceptions in adults was conspicuously lacking, as would be expected in a series in children.

In this series, as in all cases in children, the age distribution was typical. It ranged from one day (in 1 case) to eight years (in 1 case) in the 42 primary intussusceptions, with 31 cases, almost three-quarters of the total number, occurring within the first year of life. In the 6 instances of secondary obstruction, on the other hand, the age range was from 1½ to 10 years, and 5 of the children were three years of age or over.

In 40 of the 42 primary obstructions it was possible to determine the location of the intussusception. Twenty-two were ileocolic, 5 ileoileocolic, 1 ileoileal, 11 colocolic, and 1 ileocolic and colocolic. In 1 of the 2 cases in which the anatomic diagnosis was not made the child died without operation or autopsy, and in the other instance the abdomen was not opened because reduction was successfully accomplished by barium enema.

The first step in the management of a child with intussusception must usually be an attempt to improve his general status, which is

likely to be poor, especially if he is very young, because of shock brought on by severe pain, ischemia of the bowel wall, and loss of blood into the intestinal lumen. Whole blood is the most important part of preoperative preparation and transfusions should be continued during the operation.

Operation, which is the treatment of choice in both primary and secondary intussusception, is performed as soon as the child's condition warrants it. Barium enema has been successful in some hands—sometimes accidentally, in the course of the diagnostic work-up, and sometimes when it was used deliberately—but in our opinion it has no advantages, but instead has a great many disadvantages, in comparison with operative treatment. This is particularly true when the child is seen late, as so many of these children are, and there is uncertainty about the state of the bowel wall.

The technic is simple. We prefer a right-sided incision, either paramedian or transverse, even if the intussusception has progressed into the left colon. Reduction is the indicated procedure unless the condition of the bowel wall demands resection. All manipulations should be gentle. Reduction is effected by a milking action on the intussuscipiens, not by a pulling action on the intussusceptum. If reduction of an ileocolic intussusception through the ileocecal valve is difficult, as it frequently is in this final phase, it can be expedited by the procedure described by Sawyer for manual dilatation of the ileocecal valve. The treatment of primary intussusception should be limited to simple reduction; attempts to fix the cecum or terminal ileum are unnecessary and ineffective, and may be harmful.[1] Certainly they introduce a risk out of all proportion to the risk of recurrent intussusception, of which there was no instance in this series. In secondary intussusception our own preference is to remove the precipitating lesion at the primary operation rather than later, as recommended by Ladd and Gross.[2]

Although the technic was not used in any case in this series, it seems to us that a modified Mickulicz type of operation, as described by Ladd and Gross,[2] might have a limited application in irreducible ileocolic intussusception in children who present poor surgical risks. The double-barreled enterostomy should be closed in 12 to 14 days because infants and young children do not tolerate small bowel fistulas for long periods of time.

There were no deaths in the 39 cases in this series in which simple reduction of the intussusception was possible. There were 7 deaths in the 9 cases in which resection was necessary and in all of which primary anastomosis was performed. Resection is obviously not a desirable procedure, but an examination of these 7 deaths makes it

quite clear why they occurred and why this operation had to be done. The average duration of illness in the 9 patients who required resection was 92 hours, almost four days, against an average duration of 30 hours in the cases in which only reduction was necessary. Six of the 7 children who died were under 2½ years of age, and 5 of the deaths occurred in the 35 colored patients.

Congenital Obstructions

External Hernia. The 24 incarcerated external hernias in this series form the second largest group of cases and represent about 21.4 per cent of the total number of small bowel obstructions. In the series of obstructions in patients of all age groups previously referred to, external hernias represented 35 per cent of the total number and constituted, as in the children's series, the second largest group of cases. One of the 24 cases was an incarcerated umbilical hernia in a 2 year old colored boy, who made a smooth recovery after operation. The other 23 obstructions occurred in inguinal hernias.

All these inguinal hernias occurred in children under 3 years of age, 15 in the first year, and 10 of these in the first three months of life. Twenty of the patients were Negroes. Twenty-two of the 23 cases occurred in males, and 16 of these 22 were on the right side; 1 of the remaining cases was bilateral. The predominance of right-sided involvement can probably be explained by the high degree of mobility, the small caliber, and the thin wall of the terminal ileum on the right side, as compared with the thicker wall and larger caliber of the sigmoid colon on the left side. The ileum and cecum, for these reasons, are the structures most likely to be present in an inguinal hernia in a very young child.

Incarceration of inguinal hernias would not occur in children if operation were performed as soon as the hernia was recognized. In recent years the feeling about the surgery of hernia in children has changed considerably,[3] though there is still room for improvement. It was formerly the custom to delay operation in young children until they had reached the age of 5 or 6 years, in the meantime victimizing them with trusses, which did the hernia no good and often made them into psychiatric problems. Now it is realized that young children in normal health are excellent surgical risks, and operation under general anesthesia, preferably drip ether, is recommended as soon as the diagnosis is made after the age of 6 weeks. This is a logical point of view, since it is not to be expected that an inguinal hernia which enters the inguinal canal or extends into the scrotum will become obliterated without surgery.

The operation is extremely simple. Since there is no fascial defect, reconstructive surgery (hernioplasty) is not needed. All that is necessary is to reduce the hernia, ligate the sac high, and then excise it. This can be done through a small transverse incision along the suprapubic fold. An incision in this location is not soiled by urine and can be additionally protected by a waterproof adhesive dressing.

The policy in umbilical hernias is entirely different, since most of them will become spontaneously obliterated within the first year of life. Elective hernioplasty is therefore not preferred until after this time. We are convinced that adhesive strapping does no good—except possibly to relieve the grandmother's anxiety—and that it may do harm. Skin irritation is common, bathing is difficult, frequent visits to the physician are necessary, and it is quite possible for incarceration to occur under the dressing and to remain undetected for some time. When operation must be done, a curved subumbilical incision is used, which preserves the cutaneous umbilicus and thus eliminates the possibility of the psychologic disturbance which may occur if this structure is removed.

If an inguinal hernia should become incarcerated before operation is done, we prefer, if surgery is not urgently necessary, to reduce the hernia by conservative measures. This is usually possible by elevating both legs, applying heat, and employing gentle taxis after some sedative has been administered. Then an elective surgical procedure can be performed within the next few days. Often the incarceration can be treated at home or in the emergency room and the child need not be hospitalized until the elective operation is performed. If the incarcerated hernia cannot be reduced without operation, we prefer an oblique incision, which gives better exposure of the inguinal canal, though a transverse or right paramedian incision is necessary if concurrent abdominal exploration is indicated.

Twenty-two children in this series with inguinal hernias were submitted to surgery, with good results in 21 cases. The single death in the surgical group occurred in a 4 year old colored boy whose hernia, which contained the cecum, terminal ileum and appendix, had been incarcerated for three days. Hernioplasty was performed through an oblique incision. After operation the patient became greatly distended and death was attributed to generalized peritonitis, it being the clinical impression that damage to the bowel had not been recognized at operation and that perforation had subsequently occurred. We feel very strongly that in this type of case an additional abdominal paramedian incision should be made,

to permit careful examination of the intestine. This is not possible through an inguinal incision, while in cases in which the hernia is reduced spontaneously under deep anesthesia, the bowel is not available at all for adequate inspection.

A fatality followed conservative therapy in the only inguinal hernia in which this method was employed, but autopsy showed the bowel to be in good condition. The child, a 4 month old colored boy, was debilitated and in poor general condition, as might have been expected, since his hernia had been incarcerated for two months. He died suddenly, in extreme respiratory difficulties, 12 hours after hospitalization, and autopsy revealed an extensive bilateral aspiration pneumonia. This is a danger which must always be kept in mind in dealing with a sick, debilitated infant.

Atresia and Stenosis. Atresia is the result of a developmental defect in which canalization of part of the intestinal tract fails to occur, so that the child is born with complete intestinal obstruction. Stenosis is a lesser degree of the same type of anomaly. Canalization occurs, but it is not complete, and the resulting obstruction is also incomplete. Clinically, atresia becomes evident soon after birth, while stenosis is usually manifest later, sometimes not for a year or more. Like other congenital conditions, atresia and stenosis are seldom evident in intestinal obstructions which occur after very early childhood.

In the 16 instances of atresia in this series, 6 (4 of which were fatal) occurred in the duodenum, 4 (3 of which were fatal) in the jejunum, and 2 (1 of which was fatal) in the ileum. The 4 multiple atresias, all of which were fatal, were variously located in the duodenum and ileum, the jejunum and ileum, the ileum and colon, and the duodenum, ileum and colon.

Atresia of the intestine would be an easy diagnosis if only it were kept in mind. It should be suspected, until it is eliminated by x-ray evidence, in any newborn child who vomits greenish material (bile). X-ray diagnosis is also simple if the flat film is carefully interpreted, while Farber's test of the meconium will show a characteristic absence of epithelial cells.

Of the 5 children in this series who were not operated on, 3 died immediately after birth, from associated conditions, both congenital and noncongenital, including atelectasis, subarachnoid hemorrhage, fibrosis of the pancreas, and imperforate anus. The other 2 died three and 21 days after birth, respectively, without ante mortem diagnosis of the anomaly.

Of the 11 children who were operated on, 7 died, 2 after ileostomy, 2 after resection, and 3 after enteroenterostomy. Ileostomy

is mentioned only to be condemned. Neither this operation nor jejunostomy has any place in the treatment of intestinal atresia. One of the children treated by resection had complete atresia of the jejunum with associated volvulus of the midgut. When operation was performed, on the third day of life, 90 per cent of the jejunum and ileum was gangrenous and death occurred 16 days later, from severe inanition. The other patient submitted to resection, on the fifth day of life, had atresia and reduplication of the terminal ileum, and a Meckel's diverticulum. Extensive gangrene had occurred. This child could have been saved if simple anastomosis had been performed promptly.

All 3 children who died after enteroenterostomy had been ill more than three days and their poor general condition, rather than the atresia per se, was responsible for the fatality. In the other 4 cases in which side to side enteroenterostomy was also performed the results were excellent.

The 11 deaths in the 16 cases in this series, only 3 of which can be classified as inevitable, indicate that the index of suspicion is low in this condition and that physicians and nurses are not as aware as they should be of the implications of vomiting of bile immediately after birth. The average duration of symptoms in the 11 patients who were operated on was three and nine-tenths days, though in every instance the atresia was below the ampulla of Vater and vomiting of bile-stained material had been present since birth. This is not an atypical series. Other reported series show the same regrettable delay, which is doubly regrettable because side to side anastomosis around the site of the atresia, which is a very simple operation, will save most of these children.

Two of the 3 cases of intestinal stenosis in this series were in the jejunum and 1 in the ileum. All 3 occurred in white males. The clinical manifestations in the case of duodenal stenosis were typical of atresia in that the child vomited bile-stained material from birth. Duodenojejunostomy was performed on the third day of life and death occurred on the sixth day. The obstruction had been adequately relieved but autopsy revealed a three-chambered heart, with congestive failure. One child with stenosis of the jejunum died at 6 months, without ante mortem diagnosis or treatment. The third, who was 14 months old, had had symptoms on and off since birth. X-ray revealed an 85 per cent obstruction of the proximal jejunum. Jejunojejunostomy gave an excellent result.

Malrotation of the Intestine. To understand the clinical findings in acute intestinal obstruction caused by malrotation of the bowel it is necessary to review the embryology of this region. During the

first 10 weeks of embryonal life the intestinal tube grows at a faster rate than the peritoneal cavity, with the result that a portion of the midgut protrudes into the base of the umbilical cord. After the tenth week, the rate of growth of the peritoneal cavity exceeds that of the intestinal tract and the midgut is drawn back into the cavity, where it rotates in a counterclockwise direction. Normally, therefore, the postarterial segment of the midgut (the terminal ileum, the cecum, the ascending colon and the right half of the transverse colon) lies on the left side of the abdomen. As the anticlockwise rotation continues, the cecum, before it reaches its normal resting place in the right lower quadrant of the abdomen, is successively located in the left upper quadrant, the epigastrium, and the right upper quadrant. As rotation is completed, the cecum and ascending colon become attached to the right side of the abdomen by peritoneal reflections and the mesentery of the small bowel is similarly attached to the posterior abdominal wall.

If the bowel does not rotate completely, obstruction can occur in two ways, by direct pressure of the cecum on the duodenum and by the extrinsic pressure of the peritoneal bands which overlie this portion of the bowel. There is also a third possibility. In malrotation of the intestine the mesentery of the midgut frequently has only a short, rudimentary attachment to the posterior abdominal wall. Volvulus of the entire midgut, practically always in the clockwise direction, therefore frequently occurs, with obstruction at the duodenojejunal junction and compression of the superior mesenteric vessels.

Seven of the 9 instances of malrotation in this series were caused by extrinsic pressure on the duodenum, in children ranging in age from 1 to 9 days. In 4 of the 7 cases volvulus of the midgut was also present, though in no instance was it complete. In the 2 remaining cases the obstruction was caused only by volvulus of the midgut.

The clinical picture in malrotation with extrinsic duodenal pressure is typical. The most characteristic symptom, vomiting of bile-stained material, varying from mild to severe, is present from birth. If the obstruction is incomplete, stools are passed, and Farber's test reveals epithelial cells. The upper abdomen is distended. Flat x-ray films show distention of the stomach and duodenum, with little or no gas in the lower bowel. When the diagnosis is in doubt, barium enema will verify the incomplete rotation of the cecum. Barium must not be given by mouth, though lipiodol visualization of the stomach and duodenum is permissible if it is felt that it will supply any useful information. In our experience it usually does not.

Operative treatment of duodenal obstruction caused by malrota-

tion is simple. The peritoneal folds holding the bowel in the upper right quadrant are severed, so that the cecum and ascending colon can move to the left side of the abdomen, where they are permitted to remain. It is always necessary, however, to explore further, to be certain that a midgut volvulus is not associated with the malrotation. If this precaution is omitted, it is quite possible for the patient, although relieved of the duodenal obstruction, to die of the volvulus.

When a midgut volvulus is present alone, the cyanotic, distended small bowel presents itself as soon as the abdomen is opened. The colon cannot be seen. The entire midgut should be delivered outside of the abdomen at once and the volvulus corrected by rotating the bowel in a counterclockwise direction. Nothing else is necessary if the condition has not lasted so long that resection is required. Resection was necessary in both cases of midgut volvulus in this series. In one of the cases, in a 5 year old girl, the entire ileum was gangrenous but recovery followed primary resection and anastomosis. In the other case, the only death in the group of malrotations, the child, a Negro, died within 24 hours of birth and diagnosis was made postmortem.

Intestinal Duplication. An intestinal duplication, which is also known as an enteric cyst, is a spherical or elongated hollow structure intimately attached to some portion of the intestinal tract. It is lined by mucous membrane and its coat of smooth muscle is often continuous with that of the normal intestinal tract at the point of attachment. The condition seldom gives rise to complete obstruction, as it did in 1 of the 2 cases in this series. The symptoms are usually chronic and intermittent and a mass is usually palpable.

In the first of the cases in this series the duplication occurred in the terminal ileum, which is the most common site of the anomaly. The child, a colored male, was 2 months old. Two weeks earlier he had been operated on for incarcerated inguinal hernia. He had had no bowel movements for 48 hours before the second admission and for 24 hours he had been vomiting profusely, first clear, later green, and finally fecal fluid. The abdomen was distended and peristalsis was hyperactive but no mass was palpable. Flat roentgenograms of the abdomen revealed a picture typical of small bowel obstruction. The abdomen was opened after eight hours of preoperative preparation by means of constant intestinal decompression and parenteral fluids, including blood transfusions. The duplication, which was in the terminal 6 inches of the ileum, had enlarged to such a degree that the lumen of the ileum was completely obstructed by pressure. An ileotransverse colostomy to relieve the obstruction was followed at the end of three weeks by right colectomy and removal of the terminal ileum. Recovery was smooth.

The second patient, a colored female, was admitted to the New Orleans Charity Hospital when she was 10 days old. Symptoms had begun 36 hours before, with projectile vomiting of yellow material every two or three hours. Between these episodes the appetite was apparently unimpaired and the child continued to nurse at the usual intervals. Bowel function had been regular (two stools daily) until 48 hours before admission; during that time there had been no bowel movements except for a large, greenish-black stool passed after the use of a rectal suppository. Until the day of admission there was nothing to suggest that the child was in pain. Then she began to flex her legs on the abdomen and to cry as if in distress.

Physical examination showed a moderately dehydrated infant, with a rectal temperature of 99.2 F. A large, deep-seated, globular, cystic mass was palpable in the upper right abdomen. It moved slightly with respiration. There were no other positive findings.

After preparation with blood transfusions and other parenteral fluids, the abdomen was opened, under ether anesthesia, through an upper right transverse incision, on a diagnosis of duodenal duplication versus cystic dilatation of the common bile duct. The cystic mass in the right upper quadrant was found to be a duplication of the intestine lateral to the second portion of the duodenum. It measured about 6 by 6 cm. and contained about 100 cc. of clear, whitish fluid.

Because of the involvement of the pancreatic and common bile ducts, resection of the area of duplication was considered inadvisable and internal drainage was decided upon. The duplication was opened and the small fistula between it and the normal duodenum, which measured about 2 mm., was enlarged to 2 cm. A loop of jejunum about 24 inches from the ligament of Treitz was anastomosed to the lateral aspect of the duplication by open anastomosis, after which an enteroenterostomy was performed by the same technic between the afferent and efferent loops. The postoperative course was generally uneventful and the child was discharged on the sixteenth day after operation. Four days later he was readmitted because of vomiting and diarrhea, which the pediatric staff attributed to nonspecific enteritis and malnutrition. He responded well to forced feedings and was discharged in good condition 10 days later. When he was last seen in the pediatric clinic, five weeks after discharge, he was free from symptoms and was gaining weight rapidly.

This case is the twentieth instance of duplication of the duodenum to be recorded in the literature, and, so far as can be determined, it is the first case to be treated by internal drainage into the jejunum.

This seems a desirable mode of management when, as in this case, the pancreatic and common bile ducts are involved in the duplication and the usual type of resection would be hazardous.

Postoperative Adhesions

Postoperative adhesions are the most frequent single cause of obstruction of the small bowel in adults. In the general series of small bowel obstructions recently studied at the New Orleans Charity Hospital and Touro Infirmary they accounted for 39 per cent of all cases. In the pediatric series only 12 cases, a little more than 9 per cent, of small bowel obstructions were attributable to this cause.

In adults, gynecologic operations and appendectomy are most often responsible for postoperative adhesions. In this group of pediatric cases there were no gynecologic operations, and only 5 of the 12 obstructions followed appendectomy. The other cases followed volvulus of the midgut, intussusception, duplication of the ileum, Wilms' tumor, a penetrating abdominal wound, a perforating wound of the rectum, and pancreatitis. In the single fatal case an obstruction of the ileum followed promptly upon nephrectomy performed for a Wilms' tumor. The ileum herniated into the kidney fossa, and gangrene and perforation ensued. The 3 month old colored child died from generalized peritonitis. Two other obstructions occurred within the immediate postoperative period (three days and 11 days after operation), and all but 1 of the other cases occurred within eight months of the previous operation. The remaining obstruction occurred four years after an operation for intussusception.

Intestinal intubation, which is sometimes successful in postoperative obstruction caused by adhesions in adults, is considerably less successful in children and operation must be performed promptly when it is evident that it is not effective. Enterostomy, according to Wangensteen and others, still has a certain field of usefulness in obstructions caused by adhesions, but these fistulas are poorly tolerated by both infants and children and should be avoided.

Ascarides

Three intestinal obstructions in this series, in children 18 months, 2 years and 12 years of age, respectively, were complications of Ascaris lumbricoides infection.

Intestinal obstruction from this cause can occur in one of three ways, by the formation of a bolus of worms which actually blocks

the lumen of the intestine, by intussusception secondary to bolus-formation, and by the development of volvulus in a loop of small bowel packed with ascarides. In all 3 cases in this series a bolus of worms obstructed the lumen of the terminal ileum.

Diagnosis is seldom difficult. It is usually possible to elicit a history of infestation and perhaps of treatment for it. Roentgenograms reveal not only the typical picture of low small bowel obstruction but also often show the actual bolus of worms. The children, as in these 3 cases, are usually in poor condition and require careful preoperative preparation with parenteral fluids, including blood, and duodenal suction.

Operation was not necessary in 1 case in this series because the child, who had previously been treated with caprakol, became free of all symptoms after several hours of intubation and infusions. In 1 of the remaining cases double enterotomy was necessary because of the presence of a second bolus of worms higher in the ileum.

The bowel is best opened through a longitudinal incision but should be closed transversely, to prevent stricture. The bolus is removed through the incision, after which all the worms immediately above the site of obstruction are milked downward through the opening while those below are either milked upward in the same manner or are milked downward into the cecum through the ileocecal valve. Complete removal of all the worms is not always technically possible, and it is best not to prolong the operation in the attempt to accomplish it if the child's condition is poor. Whatever worms are left in situ can be taken care of by caprakol therapy, which should always be instituted four to five days after operation.

Obstruction by ascarides, while not frequent, comes as no surprise to pediatricians and pediatric surgeons in the South, where this type of parasitic infection is extremely common in young children.[4] This is apparently not true of other parts of the country, since the condition does not even appear in the index of Ladd and Gross' extensive textbook on abdominal surgery in children.

Miscellaneous Causes

Most of the miscellaneous causes of acute intestinal obstruction in adults, such as gallstones and mesenteric thrombosis, do not appear in young children. In this series there were 6 cases of obstruction which do not fall into any of the categories previously listed, as follows:

An 8 year old colored boy was treated successfully by resection

and end to end anastomosis for a volvulus of the ileum arising on a Meckel's diverticulum.

A 9 year old colored girl had a complete obstruction of the terminal ileum by a bezoar made up of vegetable fibers. Smooth recovery followed its removal through an enterotomy.

A 5 year old white girl, who had had recurrent attacks of abdominal pain and vomiting for the past 14 months, was seen after a week's illness characterized by the same symptoms. She was underdeveloped and greatly undernourished. Roentgenograms with a barium meal showed 85 per cent obstruction at the duodenojejunal junction. At operation the entire small intestine was found inside of a secondary peritoneal sac representing a paraduodenal hernia. After it had been reduced, partial volvulus (180 degrees) of the midgut was found. The postoperative course was uneventful.

A 9 year old Negro girl had an acute obstruction with gangrene of the terminal ileum, which was incorporated in adhesions about a recurrent appendiceal abscess. Primary resection of the bowel was followed by an uneventful recovery.

The record was incomplete in the case of a 2 year old boy operated on after five days of illness. The obstruction resulted from adhesions in the right lower quadrant of the abdomen, which were released under local analgesia. The ileum, which was accidentally opened, was closed by suture. Recovery was stormy and included drainage of a postoperative culdesac abscess. It is entirely possible that this is another instance of obstruction arising on the basis of advanced acute appendicitis.

A 3 day old colored girl was operated on, according to the record, for volvulus of the transverse colon. Seven days later she required a second operation for the release of adhesions, which were responsible for persistent abdominal distention. Death occurred three days after the second operation, from peritonitis. This case is included in the series with considerable misgivings, since the record was inadequate and the diagnosis is doubtful, volvulus of the transverse colon being practically unheard of in infancy.

Discussion

The detailed analysis which has been presented of these 123 instances of acute intestinal obstruction in infants and young children makes an extended, detailed discussion unnecessary. They carry their own lesions, particularly the fatal cases. In some of the 26 deaths the fatality was unavoidable. In many of them, on the other hand, it should not have occurred. Closer observation of the newborn child, a greater awareness of the possibilities of intestinal

obstruction in children, particularly in infancy, greater diagnostic diligence, and a prompter resort to operation could easily have turned the scale in the children's favor. It is only fair to say that the delay which was chiefly responsible for the outcome in most fatal cases was frequently not the responsibility of the hospital. The children were not seen until their condition was desperate and intestinal resection was required instead of the simpler measures which would have sufficed earlier. It is gratifying to report that a close liaison between the pediatric and surgical staffs has in recent years reduced the period between the first observation of the child and surgical consultation; the present tendency, in fact, is to call the surgeon as soon as the child is seen, and to make diagnosis as well as therapy a joint enterprise.

TABLE 2

Distribution of Negro Cases and Deaths in 123 Acute Intestinal Obstructions in Children 1-12 Years of Age

Cause	Cases		Deaths	
	Total	Negro	Total	Negro
Intussusception	48	35	7	5
External hernia	24	20	2	2
Atresia	16	11	12	9
Postoperative adhesions	12	6	1	1
Malrotation	9	7	1	1
Stenosis	3		2	
Ascarias	3	2		
Duplication	2	2		
Miscellaneous	6	4	1	1
Total	123	87	26	19

The series is so small that one hesitates to make definitive statements about the racial element. Negro admissions now predominate at the New Orleans Charity Hospital, but the number of Negro cases in this series, 87 of the 103 cases managed at that institution, is disproportionately large (table 2). Part of the explanation probably lies in the fact that with the exception of a single institution, with a very limited number of beds, Charity Hospital is the only hospital in this part of Louisiana in which Negroes can be treated. The Negro case fatality rate is somewhat lower than the white rate, but the difference is probably not significant in so small a series, particularly when all the circumstances are taken into consideration.

On the whole, the same fundamental principles of treatment are applicable to children with acute intestinal obstruction as would be used in adults, that is, immediate surgery, adequate supportive

therapy with parenteral fluids, including whole blood, the administration of oxygen, and constant intestinal decompression. Certain exceptions, however, should be noted.

In the adult, intubation with the Miller-Abbott tube is a valuable adjunct in certain types of intestinal obstruction and is sometimes curative. In children, the tube is less successful. Gastric or duodenal suction must be relied upon for intestinal decompression, and operation should not be deferred for any great length of time in an endeavor to effect a cure by conservative measures.

Enterostomy, as already pointed out, while it has a certain limited application in the treatment of mechanical ileus in adults, is very poorly tolerated by children, particularly by infants. It is wisest to avoid it altogether except upon very special indications.

When parenteral fluids are to be administered to infants or young children, the quantities should be carefully estimated, for it is easy to overwhelm the circulatory system by the use of too large amounts of fluid, including blood, or too rapid administration. The intravenous route is the route of choice. The technical difficulties of intravenous administration can be so largely overcome by the care and diligence of surgical and pediatric staffs that there is seldom any reason today for resorting to the unreliable subcutaneous route.

Summary

There has been presented an analysis by etiologic categories of 123 cases of acute intestinal obstruction in children through the twelfth year of age who were treated at Charity Hospital of Louisiana at New Orleans and at Touro Infirmary in the same city over the five year period ending in 1950. The congenital group of anomalies, in which external hernia is included, and intussusception accounted for 102 of the 123 cases. While certain conditions which gave rise to acute intestinal obstruction in infants were in themselves lethal, many of the 26 deaths in the series occurred because diagnosis was delayed, or was not made at all, and treatment was correspondingly delayed, or was not instituted at all. The clue to the reduction of the mortality of this condition in this age group is constant awareness of the possibility of acute intestinal obstruction, diligent endeavors to diagnose it promptly, adequate preoperative and postoperative preparation, and prompt surgery. As a rule, the sooner the surgery is performed, the less radical it needs to be. A close liaison between the pediatric and surgical services, with both diagnosis and therapy conducted as joint enterprises, will do more than any other single thing to lower the mortality in acute intestinal obstruction in infants and young children. When such a liaison

exists, all of the other objectives which have been listed will be attained.

REFERENCES

1. Kahle, H. R.: Intussusception in children under two years of age; analysis of fifty-four cases from Charity Hospital of Louisiana at New Orleans, Surgery *29:*182 (Feb.) 1951.
2. Ladd, W. E., and Gross, R. E.: Abdominal Surgery of Infancy and Childhood, Philadelphia, W. B. Saunders Company, 1941.
3. Potts, W. J.; Riker, W. L., and Lewis, J. E.: Treatment of inguinal hernia in infants and children, Ann. Surg. *132:*566 (Sept.) 1950.
4. Ochsner, A.; DeBakey, E. G., and Dixon, J. L.: Complications of ascariasis requiring surgical treatment, Am. J. Dis. Child. *77:*389 (March) 1949.

THE MANAGEMENT OF STAGHORN RENAL CALCULI

CHARLES L. PRINCE, M.D., F.A.C.S.
PETER L. SCARDINO, M.D.
JOSEPH C. PRESTI, M.D.
Savannah, Ga.

THE purpose of this presentation is: (1) to review briefly the literature regarding staghorn renal calculi and the prevailing attitude concerning their management, and (2) to emphasize the rationale of the surgical treatment of both unilateral and bilateral branched renal calculi.

The paucity of literature concerning the management of staghorn renal calculi is most surprising when one considers the frequency of this condition and its extreme importance to the unfortunate patient. In these cases the attitude of "laissez-faire," which has been generally accepted, is doubtless responsible to a large extent as little can be written concerning palliative treatment. Recently, however, the contributions on the subject by Bugbee,[1] Pollock,[2] Prather,[3] and Priestley and Dunn,[4] have helped to clarify the problem. The realization that this so-called "conservative" management of branched renal calculi inevitably must result in progressive renal destruction is now more prevalent, and surgery in cases of staghorn calculi, unilateral and bilateral, is performed more frequently.

The management of large branched renal stones is not simple, particularly when the condition is bilateral. During the past four years we have treated 61 cases of staghorn renal calculi. In order to review and subject to criticism the management of these cases, we have divided them into the following four groups: (1) branched stone in one kidney with a normal opposite kidney, 39 cases; (2) branched stone in one kidney with pathology of the opposite kidney or ureter, 14 cases; (3) bilateral staghorn calculi, 6 cases, and (4) staghorn calculus in solitary kidney, 2 cases.

In this series, it will be seen that bilateral branched stones were present in 6, or 9.2 per cent of the cases. In the Mayo Clinic series of 382 cases of staghorn calculi, the condition was bilateral in 17.8 per cent. However, Priestley and Dunn found unbranched stones in the opposite side in 80 cases, making their incidence of bilateral calculi 38.7 per cent. Our incidence of bilateral calculi was 21.7 per cent. Forty-seven and five-tenths per cent of our cases occurred

Presented during the Hollywood Assembly of The Southeastern Surgical Congress, Hollywood, Fla., April 11-14, 1951.

in males, with 52.5 per cent occurring in females. Most series show a preponderance of staghorn calculi in males. The youngest patient with a unilateral staghorn calculus was 27 years of age, while the youngest with staghorn calculi on both sides was 26 years old. It is of interest that both of these patients were female.

The symptoms of large branched renal stones are extremely variable, and are often non-existent. It is for this latter reason that staghorn calculi frequently are described as "silent," and that the condition has progressed to more or less complete renal destruction before it is recognized. The most common symptom was pain over the involved kidney, which occurred in 61.7 per cent of the cases. Twenty-three of the 61 patients did not complain of any pain or discomfort at all. In 5 cases the chief complaint was simply "backache." In 5 instances the staghorn calculus itself was causing no symptoms and was discovered because of pain occurring on the opposite side, as the result of contralateral renal or ureteral disease. Sixteen patients, or 26.6 per cent, gave a history of gross hematuria, and in 19 cases there was a history of previous passage of stone. Forty per cent of the patients complained of dysuria, while 10 per cent had complaints chiefly of a gastrointestinal nature. Thirteen patients gave a history of nausea and/or vomiting. Pyuria was present universally in our cases, and the organism was almost invariably of a urea splitting nature.

In group 1, consisting of 39 patients with a staghorn calculus in one kidney, and a normal kidney on the opposite side, surgery was performed in 29 cases, or 76 per cent. In 5 cases surgery was advised, but refused by the patient, or as yet has not been carried out. In 5 cases, surgery was not advised, because of the age of the patient, poor general physical condition, or because of coexisting conditions contraindicating elective surgery. Of the 29 cases subjected to operation, 21, or 72 per cent underwent nephrectomy, while 8, or 28 per cent, had surgical removal of the calculus. This latter group consisted of nephrolithotomy, 3; pyelonephrolithotomy, 1; heminephrectomy and nephrolithotomy, 2; heminephrectomy for staghorn calculus occupying the lower half of a double kidney, 1; and heminephrectomy for staghorn calculus occupying one half of a horseshoe kidney, 1. In this group of 29 cases, there were no surgical deaths.

Nephrectomy for unilateral staghorn calculi in 72 per cent of cases may seem unduly high, but when all factors are taken into consideration, we feel that this figure is justified. Priestley and Dunn reported nephrectomy in 61 per cent of patients with unilateral staghorn calculi seen at the Mayo Clinic, this in spite of the fact that they state: "In general, the best results are obtained from

conservative surgical treatment in which the stone or stones are removed but nephrectomy not performed."

Recurrence, either real or pseudo, is the rule, rather than the exception, following surgical removal of branched renal calculi. In removing large staghorn calculi, it is usually extremely difficult not to leave behind small stone fragments, even when the stone is removed under x-ray control. These small remaining fragments almost invariably result in persistent infection and recurrent stone formation. The frequency and importance of these "left over" renal calculi and their relationship to "pseudorecurrence" was emphasized by Barney[5] many years ago. Recurrent stone formation and persistent infection usually lead to continued illness, and often to secondary surgery and economic embarrassment. It is our feeling that these factors frequently outweigh the possibility of serious renal disease developing in a normal remaining kidney. Twinem[6] followed 250 renal operations for stone, and found recurrence in the opposite kidney in 7 cases, or 2.8 per cent. He feels that the small percentage of recurrence in the opposite kidney emphasizes the great importance of local factors in stone formation, since in most of his cases the general metabolism of the patient was in no way altered. Brongersma,[7] Winsbury-White,[8] and Braasch and Foulds[9] all report incidence of involvement of the opposite kidney following primary nephrectomy to be less than 3 per cent. In our series, although of brief duration, there has not as yet been a single instance of evidence of renal disease developing in the remaining kidney which was normal at time of nephrectomy. Oppenheimer[10] followed a series of cases of renal calculi for an average of four years after surgical removal of the stone. He found the incidence of true recurrence of stone plus the incidence of residual or pseudorecurrence to be 54.0 per cent following pyelonephrolithotomy and 58.6 per cent following nephrolithotomy. Also to be taken into consideration when considering the type surgery to be carried out is the fact that the immediate surgical mortality following nephrolithotomy and pyelonephrolithotomy is considerably higher than following nephrectomy. In the face of marked impairment of renal function associated with heavy infection and a normal opposite kidney, we have not hesitated to recommend nephrectomy in the majority of instances of staghorn calculi. However, in young or middle-aged patients, when renal function on the involved side has not been too severely impaired, and when the size and physical characteristics of the stone suggest fair possibility of complete removal, we feel strongly that removal of the stone should be carried out.

In group 2 there were 14 patients with a staghorn calculus on

one side and pathology of the opposite kidney or ureter. With regard to this contralateral pathology, the most important fact is that in each of the 14 cases the disease on the opposite side was of a calculous nature, or the result of stone formation on that side. In this group, the pathology ranged from a single small calculus in the opposite kidney, to a large unbranched type calculus, to complete destruction of the kidney as the result of a large impacted ureteral calculus with associated pyonephrosis. In these 14 cases surgery was advised in 13, was carried out in 11, and was not advised in 1. In these 11 cases a total of 16 operations were performed, as would be expected with the bilaterality of the pathology. Stones were removed from the opposite kidney in 6 instances, and from the opposite ureter in 5 instances. Removal of the opposite kidney was carried out in 1 case because of nonfunctioning calculous pyonephrosis, after the staghorn calculus had been removed previously by nephrolithotomy. In this group, the staghorn containing kidney was attacked surgically only four times, indicating that in most instances surgery of the contralateral kidney was of primary importance. In 2 cases nephrolithotomy was performed. In the remaining 2 instances, nephrectomy was carried out, only after surgery had been performed on the opposite side, and only after it had been demonstrated that the staghorn-containing kidney had been destroyed completely. It is obvious from the outset that these patients in group 2 were much more seriously ill than those in group 1, and that their outlook was not nearly so good. Bilateral renal impairment resulted in uremia in many of the patients in this group. Every case of this type must be studied carefully and handled as indicated, with every effort being directed toward the preservation of renal function. One death occurred in this group but not as the result of surgery upon the staghorn bearing kidney. This man, aged 55, was extremely obese and severely hypertensive. There was a large staghorn type calculus filling the left renal pelvis and calyces, with no demonstrable function through this kidney on intravenous urography. There was a fair sized partially blocking stone impacted in the pelvic portion of the right ureter. Right ureterolithotomy was performed under sodium pentothal-cyclopropane anesthesia, with the aid of intravenous curare. The patient left the operating room in good general condition but had not responded four hours later. Investigation revealed a complete left hemiplegia, which the medical consultant felt was the result of a massive cerebral hemorrhage which occurred during the operation. The patient remained comatose, went steadily down hill, and died on the fourth postoperative day. Shortly before death there was hyperpyrexia of 106.8 degrees.

Priestley and Dunn showed the prognosis to be definitely worse when bilateral branched calculi were present, than when there was a branched calculus in one side and an unbranched calculus in the other side. With bilateral branched calculi, they found the most favorable survival rates after removal of the stones from both kidneys. In contrast, the poorest survival rates followed non-operative treatment. They traced 20 patients with bilateral staghorn calculi on whom no surgery was performed and found that only 10, or 50 per cent, were alive at the end of five years. They then traced 21 patients who had undergone bilateral removal of the branched calculi, and found 95 per cent alive at the end of five years. It seems quite apparent, therefore, that the best results are obtained in cases of bilateral staghorn calculi following surgical removal of the stones from both kidneys, and that this should be done whenever possible. Palliative measures in these cases result only in progressive renal destruction and in most instances are to be condemned heartily. It is on the basis of this evidence that we have treated patients with bilateral staghorn renal calculi during the past few years.

Of the 6 patients in group 3 with bilateral staghorn calculi, only one refused surgery. Four have undergone bilateral operations for removal of the calculi, while one has had surgery on one side and is awaiting surgery on the opposite kidney. In these 5 patients there has been a total of 9 operations without mortality. Each operation has been nephrolithotomy or pyelonephrolithotomy. We have made it a practice to operate on the kidney showing the most function first, unless pain or other circumstances influence otherwise. The contralateral kidney has been operated upon as soon as practicable after the original operation. Impaired renal function, severe renal infection with intractable chills and fever, or general physical debilitation have not deterred us from surgery. Age perhaps is the primary deterring factor in these cases. Every effort is exerted to bring these patients to a state of optimum preoperative condition. Antibiotic therapy, transfusions, intravenous fluids, vitamins, and correction of acid base balance are important prior to surgery. With careful preparation, it is our feeling that the great majority of cases with bilateral staghorn calculi can be operated upon with little risk. These patients are few in number and have been followed a short time, so that our end results are as yet inconclusive. However, we feel that the clinical improvement demonstrated in almost every case following bilateral nephrolithotomy has been very encouraging and that future study of these cases is warranted.

The first patient in group 4 was a 56 year old white male who underwent right nephrectomy for calculous pyonephrosis 16 years prior to our examina-

tion. Studies revealed an early staghorn calculus occupying the pelvis and lower calices of the remaining left kidney. Renal function was good. Nephrolithotomy and nephrostomy were carried out and the stone was removed in one piece. Postoperatively oliguria persisted for several days. The blood NPN rose to 120 mg. per 100 cc. On the sixth day after operation, however, urinary output increased. On the eighteenth day following surgery, the blood NPN had dropped to 40 mg. per 100 cc. The urinary volume returned to normal and the patient was discharged. Check-up was carried out 18 months later. The patient was asymptomatic. The urine was microscopically negative and culture was sterile. Two hour PSP showed excretion of 60 per cent. Plain KUB film showed no evidence of stone, and intravenous urograms were essentially normal. The second case in this group was a 64 year old man who underwent removal of the right kidney 30 years ago because it had been completely destroyed by an impacted ureteral calculus. When we saw him recently he had a large staghorn calculus almost filling the pelvis and calices of the solitary left kidney, with moderate impairment of function. Following nephrolithotomy and nephrostomy, this patient also suffered a period of temporary renal suppression, with elevation of the blood NPN to 80 mg. per 100 cc. on the fifth day postoperatively. From this time, however, urinary output increased steadily, and at the time of discharge from the hospital on the twentieth day after operation, the blood NPN was 48 mg. per 100 cc. These cases are discussed in slight detail simply to illustrate that it is feasible to carry out surgical removal of a staghorn calculus from a solitary kidney without undue risk. If the immediate period of renal suppression which occurs almost invariably can be combated successfully, there is little more risk attached to surgery in these cases than in cases in which the opposite kidney is diseased or normal.

Summary and Conclusions

A group of 61 cases of staghorn calculi has been presented, and the treatment analyzed.

In this group of cases there have been 56 operations, with an overall surgical mortality of 1.8 per cent.

In cases of a staghorn calculus in one kidney and a normal opposite kidney, nephrectomy was carried out in 72 per cent. The branched stones were removed in the remaining 28 per cent. The reasons for nephrectomy in the majority of cases have been discussed, together with the possibilities of disease developing in the remaining kidney. Staghorn calculi should be surgically removed in young or middle-aged patients, when renal function on the involved side has not been too severely impaired, and when the size and physical characteristics of the stone suggest the possibility of complete removal.

When there is a staghorn calculus in one kidney and pathology of the opposite kidney or ureter, surgery of the contralateral side is usually of primary importance. The pathology on the opposite side is almost always of a calculous nature. These cases must be handled individually as indicated, after careful study, with preservation of renal function being of paramount importance.

The prognosis is worst with bilateral staghorn calculi. We concur with Priestley and Dunn that the best results and longest survival rates are obtained following surgical removal of the stones from both kidneys. This should be done whenever possible.

It is possible to remove a staghorn calculus from a solitary kidney without undue risk. This should be done whenever the general condition of the patient warrants.

Surgery for removal of staghorn calculi should be performed with greater frequency. In general the results are excellent, longevity increased, and the mortality low enough to warrant surgical intervention.

REFERENCES

1. Bugbee, H. G.: Nephrolithotomy for recurrent branching calculi, J. Urol. *52:*99 (Aug.) 1944.
2. Pollock, L. H.: Staghorn calculus removal by V-shaped nephrotomy, J. Missouri M. A. *39:*48 (Feb.) 1942.
3. Prather, G. C.: Review of "V" type nephrotomy for staghorn calculus with special reference to final results, Am. J. Surg. *39:*589 (March) 1938.
4. Priestley, J. T., and Dunn, J. H.: Branched renal calculi, J. Urol. *61:*194 (Feb.) 1949.
5. Barney, J. D.: Recurrent renal calculi, Surg., Gynec. & Obst. *35:*743 (Dec.) 1922.
6. Twinem, F. P.: Study of recurrence following operations for nephrolithiasis, J. Urol. *37:*259 (Feb.) 1937.
7. Brongersma, H.: Reports of Second Congress, Société Internationale d'Urologie, Rome, *1:*351, 1924.
8. Winsbury-White, H. P.: Review of one hundred and sixty-two consecutive personal cases of stone in upper urinary tract, Brit. J. Urol. *6:*142 (June) 1934.
9. Braasch, W. F., and Foulds, G. S.: Postoperative results of nephrolithiasis, J. Urol. *11:*525 (June) 1924.
10. Oppenheimer, G. D.: Nephrectomy versus conservative operation in unilateral calculous disease of upper urinary tract, Surg., Gynec. & Obst. *65:*829 (Dec.) 1937.

TREATMENT OF FRACTURES WITH INTRAMEDULLARY NAIL

CLAUD W. PERRY, M.D., F.A.C.S.
Anderson, S. C.

THE management of fractures is a subject which has absorbed the interest of the medical profession since its early dawn. The incidence of fracture is so common that it demands the attention of all doctors irrespective of their professed specialized field. The very fact that fracture treatment cannot be categorically relegated to the general practitioner, the general surgeon or the orthopedic surgeon, may in itself account for the fact that its abuses have been many and its end results have lived to haunt its perpetrators. No single doctor can fail to recognize the inadequacies of the treatment he has carried out in many fractures.

The intramedullary fixation of fractures is not a new method. Rather it is a method which, as pointed out by Dr. Dana M. Street,[1] has had its various proponents in each of the four decades of this century. The emancipation of this method, however, waited upon a very opportune time when two very fortunate circumstances joined together to make its evolution complete. These circumstances being the onset of hostilities in the late World War and the concurrent appearance of penicillin and the other antibiotics made available for general use. Dr. Leslie V. Rush and his brother,[2] in a published article concerning intramedullary pinning, have made mention of the fact that early in the course of this conflict when the first few prisoners of war began to trickle through, it was observed that a goodly number of these men had been treated by intramedullary pinning. This fact was made common knowledge through an article which appeared in the Reader's Digest. As the war wore on more and more of these cases were observed and the results compared more favorably with the regimen of skeletal traction and immobilization in plaster cast which remained the procedure of choice in the Allied Medical Corps. Since the end of the war the impetus of this movement has gained ground steadily so that at the present time the use of the intramedullary pin is generally accepted throughout the country. We of the South should feel some satisfaction in that probably the two best known proponents of this procedure, namely, Drs. Rush and Street, hail from the states of Mississippi and Tennessee respectively.

Material. The material presented in this paper represents 13

Presented during the Hollywood Assembly of The Southeastern Surgical Congress, Hollywood, Fla., April 11-14, 1951.

months' experience by the author dating from December 1949 through December 1950. The paper presents without reservation all of the cases treated by the author by this method in the above period. These cases, I feel sure, are representative of the usual number and type of fractures that are encountered by the ordinary general surgeon in the course of a year's practice. The cases include both private and charity cases. Chart 1 enumerates these cases in chronological order. There were 12 patients with fractures of the femur. One of these patients sustained bilateral fractures making a total of 13 fractures of the femur in 12 cases. There were 4 cases of fracture of the tibia, 2 of the ulna and radius, 2 of the humerus, 1 of the mandible and 2 of the clavicle. These fractures represent a composite group of simple transverse, simple comminuted and compound comminuted fractures. The preponderance of femurs in this presentation can be explained by the fact that all fractures of the femur treated by the author during this period were treated with the intramedullary pin with the exception, of course, of fractures in children which have been treated by Bryant's traction or by incorporation in spica cast. Numerous fractures of the tibia, ulna, radius, humerus and clavicle have been treated without the pin when it was obvious that good results could be obtained with a lesser degree of inconvenience to the patient and a lesser economical strain on the patient.

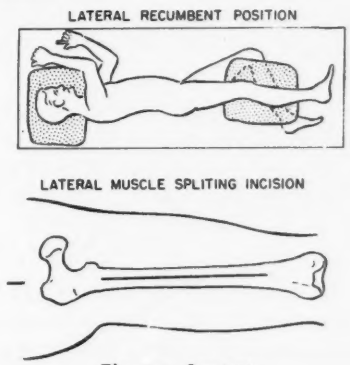

Fig. 1-a. See text

Technic. Fracture of the femur: Fractures of the femur have been uniformly treated by the author according to the method of retrograde direction of pin with direct inspection of the fracture site. The vast majority of patients are administered a low spinal anesthesia in the sitting position. The patient is then transferred from the stretcher to the operating table and placed in a lateral recumbent position (fig. 1a). An incision is made directly over the

fracture site through the lateral approach, dividing the iliotibial tract, the vastus lateralis and the vastus intermedius muscles in the direction of their fibers. The proximal fragment of the fracture is then lifted up into the wound and the proper size pin for the medullary canal is selected (fig. 1b). A guide wire is then directed up the shaft of the femur and driven through the neck of the femur. A

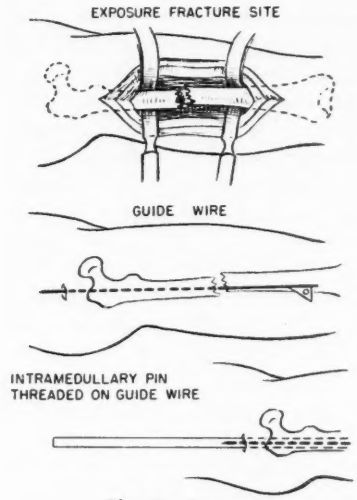

Fig. 1b. See text

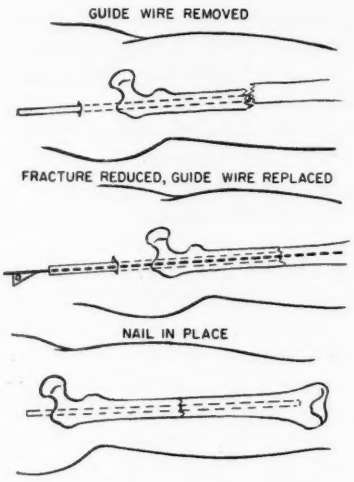

Fig. 1-c. See text

short counter incision is made just superior to the greater trochanter and the guide wire is then driven through this counter incision. The intramedullary pin is then threaded over the cephalad end of this guide wire and is driven along its course through the medullary canal to the site of the fracture (fig. 1c). The guide wire is then removed and reinserted in the cephalad end of the medullary pin. It is then driven down to the fracture site. The fracture site is reduced and the guide wire is then driven across the fracture site. The intramedullary pin is then driven across the fracture site. At this point the guide wire is removed and discarded. The intramedullary pin is further driven along the medullary canal until it is buried well in the intertrochanteric fossa. The incisions are then closed in layers and the extremity is wrapped in Ace bandages from the toes to the groin.

Fracture of the tibia: The large majority of these fractures are given a low spinal anesthesia with the patient in the sitting position. The patient is then transferred to the operating table and the ex-

tremity prepared and a short incision is made over the medial surface of the tibia in its upper third just opposite the tibial tubercle (fig. 2a). The periosteum is incised and dissected away from the shaft of the tibia. A proper size drill is selected and a hole is bored into the tibia in an oblique direction until the medullary canal is contacted. A proper length Rush nail is selected and inserted into

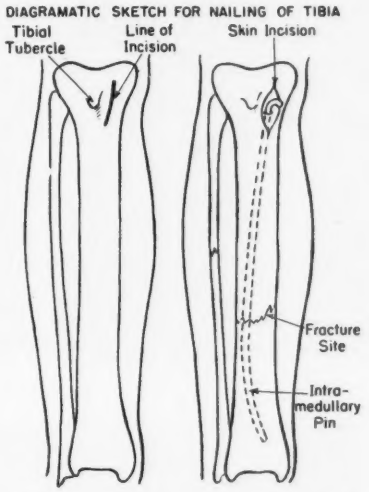

Fig. 2-a. See text Fig. 2-b. See text

the drill hole and driven down the medullary canal to the site of the fracture. Exposure of the fracture site may or may not be necessary according to the difficulty of reduction in the individual fracture (fig. 2b). With the fracture reduced and the nail in place, x-ray films are made and if satisfactory the operative wounds are closed. A light cast below the knee is usually applied by the author but may not be necessary.

Fracture of the humerus: Under pentothal or inhalation anesthesia a short incision is made over the upper and lateral aspect of the shoulder joint. The fibers of the deltoid are divided longitudinally and the greater trochanter of the humerus palpated (fig. 3a). Without further disturbance to the capsular structure of the shoulder joint a proper size drill is selected and is directed down the shaft of the humerus from a point just opposite the greater trochanter at the junction of the shaft and the head of the humerus. Undue damage to the capsular structure is avoided by rotating the drill backwards and forwards through a quarter turn. Once the cancellous structure of the upper end of the humerus is contacted

the drill is withdrawn, a proper length intramedullary nail is selected and is driven down the shaft of the humerus to the point of the fracture. Exposure of the fracture site may or may not be necessary, depending upon the facility with which the nail may be driven across the fracture site (fig. 3b). Once satisfactory position of the nail is obtained and confirmed by x-ray pictures, the operative

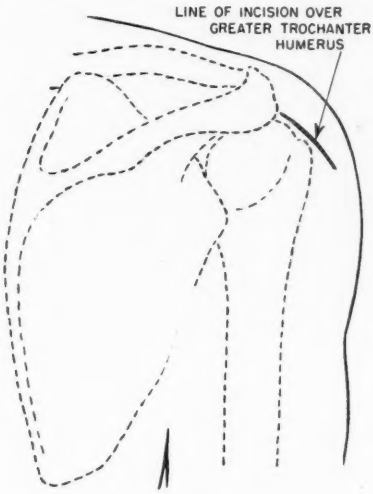

Fig. 3-a. See text

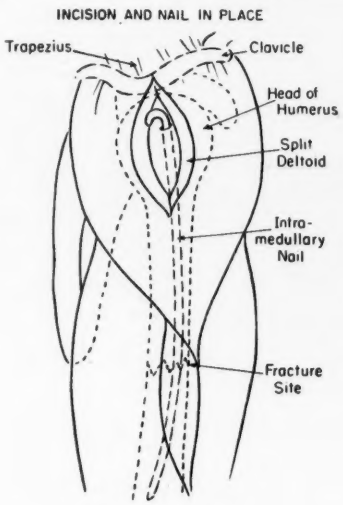

Fig. 3-b. See text

wounds are closed, a surgical dressing is applied and the patient is returned to the room without further immobilization.

Fractures of the mandible, clavicle and phalanges may all be treated in a similar manner along with the ulna and radius. The technic in any of these fractures may be varied somewhat according to the exigencies of the case.

Case Histories

Some of the peculiar advantages of the intramedullary pin might best be cited in individual case histories.

Case 2, Chart I. M. O., a 26 year old white male, was involved in a serious automobile accident on New Year's evening 1950. The patient was seen in the emergency room of the hospital immediately after transportation from the scene of the accident. This patient had an obvious fracture of the shaft of the left femur (fig. 4abc). Only moderate shock was present and there were no other concomitant injuries on superficial examination. X-ray examination of the left femur revealed a very complicated fracture. There was a transverse fracture in the upper third and in the middle third of the

shaft of the femur. The distracted bone lying between the fracture sites was comminuted. Fixation of this fracture by any other means than intramedullary nail immediately posed the problem of prolonged hospitalization in tedious skeletal traction. This patient was temporarily splinted, put to bed and observed for a period of 36 hours prior to surgery. During this time he completely recovered from his initial shock. He was then taken to surgery, the

Fig. 4a

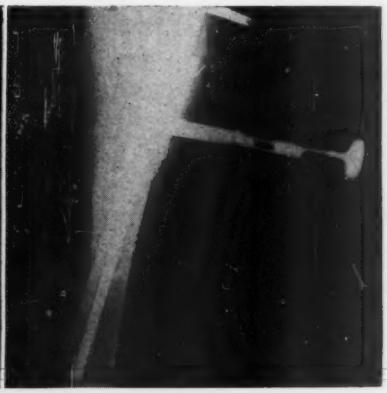

Fig. 4b

Fig. 4c

Fig. 4. Case 2, M. O., age 26, double fracture shaft of the left femur. (a) Preoperative film 1-1-50, (b) Immediate postoperative film 1-3-50, (c) End result, 9-9-50.

fracture site was exposed and a clover-leaf type pin was used to span the site of the fracture. The comminuted fragments of the middle portion of the shaft were encircled by a loop of steel wire to obtain satisfactory approximation and maintain leg length. Convalescence was totally uneventful and he was discharged from the hospital on the tenth postoperative day. The patient was allowed on crutches on the seventh postoperative day. His convalescence

at home was equally satisfactory and at the end of five and one-half months he had returned to his previous occupation in a textile mill even before I was aware of the fact. He returned to the hospital on the first day of the ninth postoperative month and was kept in the hospital for a period of 48 hours for removal of the intramedullary pin. There was no further loss of time from work due to this procedure.

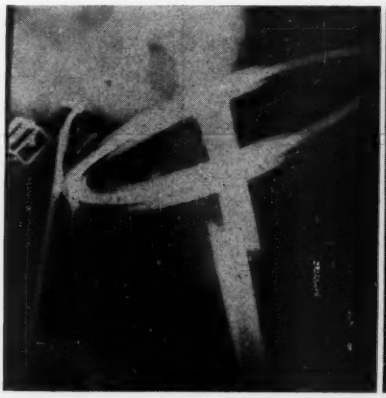

Fig. 5a

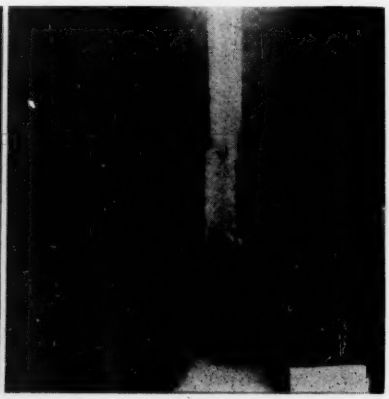

Fig. 5a

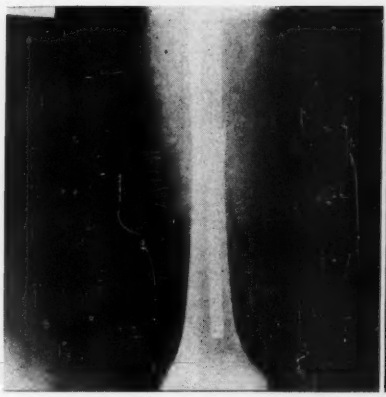

Fig. 5b

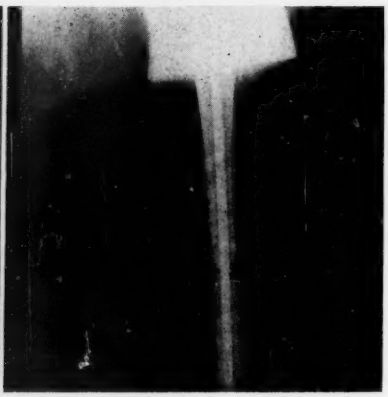

Fig. 5b

CASE 8. O. F. was admitted to the hospital on the night of December 7 1950. The patient was a 19 year old colored male who had suffered severe injuries in an automobile accident. He was in marked shock, with a blood pressure of 70/50. Superficial examination revealed bilateral fracture of the shafts of the femurs in the middle third associated with a ragged laceration on the inner surface of the right arm, multiple minor lacerations of the face and a serious repulsive avulsion and laceration of the nose through the piltrum and upper lip with complete separation of the soft tissue of the nose from the bony moorings (fig. 5abc). There was associated concussion manifested by stupor and confusion. Due to the soft tissue damages in the face and upper

extremity, surgery could not be delayed in this case. After the immediate shock was overcome with blood transfusions the patient was carried to surgery and under spinal plus sodium pentothal anesthesia an open reduction of the fractures of the right and left femurs with retrograde intramedullary nailing was carried out. On completion of these procedures the soft tissue injuries

Fig. 5c

Fig. 5. Case 8, O. F., mid shaft fracture of both femurs. (a) Preoperative films 12-7-50. (b) Immediate postoperative films. Kuntscher nail to left and Hansen Street nail to right. (c) Re-check film 1-22-51. Note a slight angulation in Hansen Street nail and also early strong callus.

of the face and upper extremities were debrided, irrigated and repaired. The patient withstood the operative procedures well and shock was never a problem after initial treatment was instituted. Postoperatively he posed a nursing problem because of his mental confusion and restlessness. Physical restraints were necessary to prevent him from getting out of bed. Intravenous feedings were continued until the fifth postoperative day when he cleared sufficiently mentally to tolerate a soft diet. Postoperative recovery was uneventful except for the mental confusion just described. He was discharged from the hospital on the eleventh postoperative day under the care of his immediate family. This patient was next seen on check-up two months later and was found to have completely recovered from his mental fog. There was slight bowing at the fracture site in the left femur with an angle of deformity of approximately 174 degrees. There was no motion in either fracture site. X-ray examination revealed excellent callous formation. The patient exhibited full active motion in the joints of the hips, knees and ankles and there was no swelling in the distal extremities. The angulation of the nail in this case represents a single instance in this series. Fortunately this angulation is minimal and will prove of no consequence from a functional standpoint.

CASE 13. Master B. T., a 6 year old white male, injured on May 30, 1950, when he ran in front of an approaching car near his home. Injuries consisted of brush burns of the right thorax and right leg. There was a long, dirty linear laceration along the medial aspect of the left leg extending from the internal malleolus to the popliteal fossa. The fractured ends of the tibia in the middle third of the shaft were presenting in the wound. The anterior flap of skin was completely avulsed from the underlying bone and soft tissues

and represented a full thickness skin graft (fig. 6abc). This patient was treated for shock and carried to surgery after stabilization was obtained. Copious irrigation and debridement of the wound was carried out. The upper end of the tibia was exposed, a small opening made on the medial surface of the tibia and a small clover-leaf intramedullary pin inserted and driven across the fracture site, obtaining excellent reduction and fixation of the fracture.

Fig. 6a

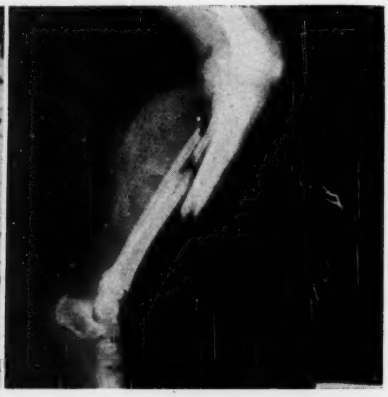

Fig. 6a

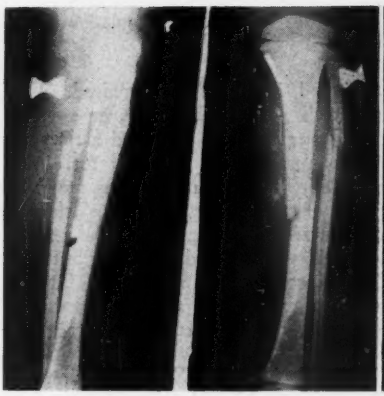

Fig. 6b

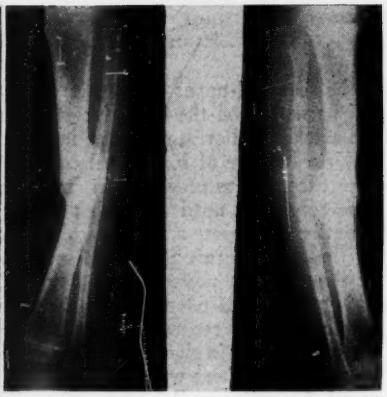

Fig. 6c

Fig. 6. Case 13, Master B. T., age 6, severely compounded fracture of tibia. (a) Scope of soft tissue damage and preoperative film dated 5-30-50. (b) Postoperative film 6-9-50 at a time of first dressing of leg. (c) Final result showing some angulation but firm union 1-15-51.

The skin edges were then closed with dermal sutures and a long leg cast applied. Subsequent dressings of the leg were carried out on June 8, 12 and 16. During the dressing it was apparent that a portion of the anterior skin flap was sloughing over an area the size of the palm of the hand immediately opposite the fracture site. Skin grafting was delayed until subsequent readmission on July 25, 1950. X-ray at this time revealed good callous formation in

progress and the fibula was united. At operation on July 29, 1950, a split thickness skin graft was placed over the granulating surface and the intramedullary pin was removed from the shaft of the tibia. The take of the skin graft was satisfactory and he was discharged from the hospital on August 4, 1950. He was readmitted on August 28, 1950, exhibiting some degree of local infection over the shaft of the tibia. There was evidence of active periostitis. He was placed on daily penicillin therapy. X-ray examination during this time revealed slow healing with some evidence of medial bowing at the fracture, first recorded on September 6, 1950. The patient was discharged from the hospital again on September 19, 1950. Subsequent to this discharge he had shown gradual and complete healing at the fracture site with a minimum amount of medial bowing deformity. Due to the peculiar emotional instability of this child and the inability of mother to command obedience it was felt unsafe to leave him out of a cast, and he was carried in a cast for most of the time during the last six months of his convalescence. The child was last seen on February 15, 1951, at which time his cast was removed and he was allowed to begin full weight bearing without the aid of crutches or stick.

CASE 14. W.M. This complicated fracture was first seen on March 16, 1950. The patient was a 29 year old colored male who was injured in an automobile accident. The fracture represented a transverse fracture through

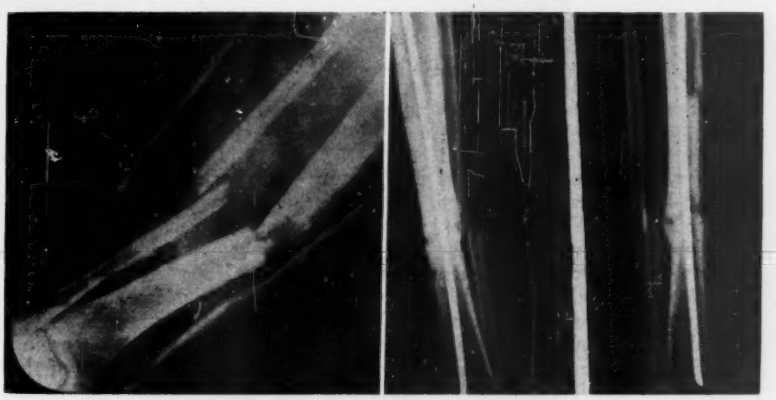

Fig. 7a Fig. 7b

the distal third of the tibia with a small comminuted segment on the medial surface of the fracture line. The skin overlying the fracture was macerated and bruised and there was a small puncture wound through the skin at the fracture site (fig. 7abc). An attempt was made to treat this fracture as a simple fracture and reduction and immobilization in a long leg cast was performed under spinal anesthesia. Subsequent x-ray examination revealed angulation at the fracture site and several manipulative attempts were made to correct this deformity. The cast was changed on March 29, 1950. There was considerable slough of skin over the fracture site and a small loose fragment of bone was found to be protruding from the wound. This fragment was removed, the slough debrided and the leg was recast. The patient was discharged on April 6. He was readmitted on May 1 and a split thickness skin graft was performed to cover the granulating surface on the medial aspect of

the leg over the fracture site. The take of the graft was satisfactory and he was discharged on May 13. He was readmitted on June 5, 1950, for the third time. At this time, almost three months from date of injury, there was no evidence of callous formation about the fracture site and clinical examination of the fracture showed complete instability. Consequently a Rush intra-

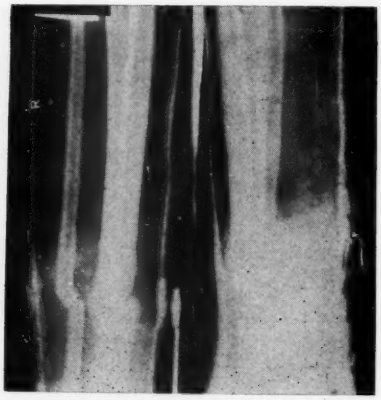

Fig. 7c

Fig. 7. Case 14, W. M., complicated fracture of lower third of tibia. (a) Attempt at closed reduction 3-29-50. (b) Film made 11-19-50 showing sliding bone graft used after nail had been in place six months without x-ray evidence of union. (c) Evidence of early union two months later on 1-22-51.

medullary nail was driven across the fracture site after open reduction was made. A long leg cast was applied. He was discharged from the hospital again on June 23, 1950. During the next six months follow-up revealed excellent stabilization of the fracture and he was allowed weight bearing in a walking cast without fear of displacement of the reduction. However, repeated examinations at monthly intervals failed to show any appreciable callous formation across the line of the fracture. Consequently he was readmitted to the hospital for the fourth time on November 13, 1950, and without disturbing the intramedullary pin a sliding bone graft was slipped across the site of the fracture. It was felt unnecessary to fix this bone graft with any screws or wires. The leg was recast and he was discharged from the hospital on November 28, 1950.

This patient was last seen on March 15, 1951, at which time there was x-ray evidence of union across the fracture site. He was bearing full weight on the affected side without the aid of crutches or stick. A moderate amount of dependent edema persisted if he was up on the leg during the entire day.

CASE 18. H. J., a 28 year old white male who suffered a severe compound fracture of the left ulna and radius while at work in one of the textile mills. Unfortunately a period of 12 hours was allowed to lapse before he was admitted to the hospital for definitive treatment of his fractures. Examination of his left arm revealed a swollen tender forearm with two jagged lacerations on the volar surface which had been partially and hastily sutured with catgut. The skin edges had not been debrided. There was another laceration at the elbow similarly treated. There was a fracture of both bones in the distal

third of the forearm (fig. 8abc). He was taken to surgery and thorough debridement and irrigation of the wound was carried out. Intramedullary pins were placed across the fracture sites of the ulna and radius. No attempt was made to close the operative wounds. He was returned to surgery on May 24 the fourth postoperative day, and secondary closure of the wounds carried out, using a split thickness graft over the wound over the ulna. The subse-

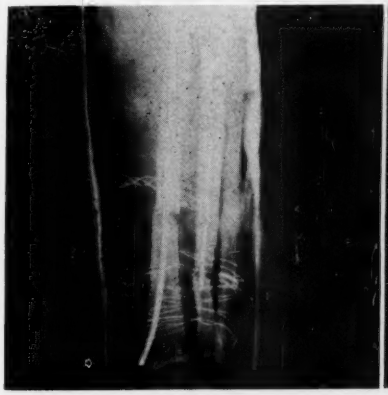

Fig. 8a

Fig. 8b

Fig. 8c

Fig. 8. Case 18, H. J., compound fracture both bones of forearm. (a) First postoperative film 5-29-50. Note distraction in radius. (b) Re-check film 8-29-50. Note persistent nonunion at site of distraction. (c) Film at 1-2-51 when solid union was obtained after bone graft and plating in September, 1950.

quent hospital stay was uneventful and he was discharged on May 29, 1950. Subsequent follow-up revealed excellent stabilization at the site of the fractures but x-ray examinations failed to show union across the fracture site. Shortly after the subsidence of the edema and insult of injury and operative procedures it was determined that there was a complete radial nerve palsy. No immobilization of the arm was necessary from the time of discharge from

CHART 1

Case	Fr. Site	Hosp. Stay	Follow Period	Complication	Type Pin	Summary
1. A.P	S. Femur	18	15 mo.	None	K.	Rehab. 6 mo.
2. M.O.	S. Femur	14	15 mo.	None	K.	Rehab. 6 mo.
3. H.H.	S. Femur	12	9 mo.	None	K.	Rehab. 6 mo.
4. R.G.	C. Femur	16	9 mo.	None	H.S.	Rehab. 4 mo.
5. R.C.	C. Femur	23	6 mo.	None	K.	Rehab. 6 mo.
6. G.R.	S. Femur	12	5 mo.	None	K.	Not returned to work
7. M.B.	S. Femur S. Clavicle	13	5 mo.	None	K. R.	Rehab. 4 mo.
8. O.F.	S. Femur bilateral	11	5 mo.	None Bent nail	K. H.S.	Not returned to work
9. O.C.	S. Femur	11	4 mo.	None	K.	Not completed
*10. J.E.	S. Femur	16	5 mo.	Rotation	R.	Not completed
*11. W.H.	S. Femur	12	4 mo.	None	R.	Not completed
*12. E.O.	S. Femur	12	4 mo.	None	R.	Not completed

*Cases of Dr. C. Wilson Orr kindly loaned to the author for this presentation.

CHART 1—*Continued*

13. B.T.	C. Tibia	75	11 mo.	Skin graft periostitis delayed union	K.	Rehab. 11 mo.
14. W.M.	C. Tibia	66	12 mo.	Skin graft nonunion bone graft	R.	Not completed rehabilitation
15. W.W.	S. Tibia	4	9 mo.	None	R.	Rehab. 3 mo.
16. C.G.	S. Tibia	6	4 mo.	None	R.	Rehab. 4 mo.
17. E.M.	C.U.&R.	5	11 mo.	None	S.	Rehab. 1 mo.
18. R.J.	C.U.&R.	18	11 mo.	Skin graft nonunion radial nerve palsy	K.	Not completed
19. B.P.	S. Humerus	10	9 mo.	None	R.	Rehab. 2 mo.
20. L.S.	S. Humerus	7	9 mo.	None	R.	Rehab. 2 mo.
21. C.C.	C. Mandible	6	7 mo.	None	K.W.	Rehab. 1 mo.
22. J.D.	S. Clavicle	2	3 mo.	None	S.	Rehab. 3 wks.

K—Kuntscher nail. H.S.—Hansen-Street nail. R—Rush nail. K.W.—Kirshner wire.

the hospital. A corrective splint was applied to the forearm to prevent contracture deformities as a result of the radial nerve palsy. Nonunion at the fracture site persisted with evidence that the intramedullary pin in the radius was causing distraction. For this reason he was readmitted to the hospital on October 4, 1950, for exploration of the radial nerve and removal of the intramedullary nail and an onlay bone graft of the left radius. Exploration of the radial nerve revealed irreparable damage over a distance of five inches. Any attempt to perform nerve graft or re-establish the continuity of this nerve was abandoned. The intramedullary nail was removed from the left radius and an iliac graft was placed over the fracture site. The arm was immobilized in a long cast with the elbow held at 90 degrees. The patient was discharged from the hospital on October 11, 1950. At the end of eight weeks x-ray examination of the fracture site revealed solid union about the bone graft. He presented clinical evidence of good bony union. There was no contracture of the joints of the hand, the wrist or the elbow. Pronation and supination were limited. He has subsequently been referred to an orthopedic surgeon for tendon transplant to overcome the wrist drop associated with his permanent radial nerve palsy.

Discussion

Thirteen femoral fractures occurring in 12 patients are presented in this paper. Only 2 complications arose. In case 8 there was a minor degree of angulation of the nail at the fracture site. In case 10 there was a minor degree of external rotation of the distal fragment on the proximal fragment of the fracture. Neither of these complicating factors presented a functional problem and hence require no subsequent correction. Among 4 fractures of the tibia 2 presented complications. Case 13 requiring skin grafting, developed nonunion which later required bone graft. Each of these cases has arrived at complete union and rehabilitation at the present time. Two fractures of the ulna and radius are presented in one of which complicating factors were skin graft, nonunion, bone graft and radial nerve palsy. The nonunion in this case was due to improper selection of a proper size nail with subsequent distraction at the fracture site. This patient has not been rehabilitated up to the present time due to his radial nerve palsy. Two cases of fracture of the humerus are presented with no complications. One case of fracture of the mandible with no complications and 2 cases of fracture of the clavicle with no complications. The author feels that the complications encountered in this series were for the most part more readily handled and their correction greatly facilitated by the use of the intramedullary nail. This is particularly true in those fractures in which extensive soft tissue damage is encountered and subsequent skin graft is anticipated. Nursing care in the hospital is greatly facilitated in the absence of large cumbersome casts which prevent early ambulation of the patient and require skilled hospital personnel during their convalescence. The average hospital days

for the femurs amounted to 13.8 days per case, for the tibias 35.2 per case, for the ulna and radius 11.5 days per case, for the humerus 8.5 days per case. It is felt that this represents a considerable reduction in the number of hospital days that might be required for the cases under other methods of treatment, particularly in the fractures of the femur which might require long hospitalization by the method of skeletal traction. The arduous and time consuming changes of cast by other methods are largely eliminated by the method of intramedullary fixation. Likewise, the ankylosis of joints and wasting of soft tissues which are unavoidably associated with immobilization in cast prove to be inconsequential with intramedullary fixation.

In this series there were only 3 complications which might be directly attributed to the method of treatment, namely: the occurrence of angulation in one fracture of the femur, of rotation in one fracture of the femur and of distraction in one fracture of the radius.

In the opinion of the author the Kuntscher nail is best adapted to repair of the femoral fracture. The only 2 complications among the femoral fractures occurred in cases where some nail other than the Kuntscher nail was used. Likewise the case of distraction which occurred represents another technical error in that an unduly large nail was selected and caused permanent distraction at the fracture site in the radius. These errors are correctable and cannot be used as an argument against this method of treatment.

SUMMARY

1. Twenty-four cases of fracture occurring in 22 patients are presented in this paper.

2. Three complications directly attributable to the method of fixation occurred. Two of these proved to be inconsequential.

3. Length of hospitalization is appreciably lowered by use of this method. Rehabilitation of the patient is accelerated and tedious postoperative and posthospitalization care is reduced to a minimum.

4. The treatment of soft tissue injuries is facilitated by this method of fixation.

REFERENCES

1. Street, D. M.: Nailing of the femur, J.A.M.A. *143*:709, 1950.
2. Rush, L. V., and Rush, H. L.: Evolution of medullary fixation of fractures by the longitudinal pin, Am. J. Surg. *78*:324, 1949.

THE AMERICAN SURGEON

Official Publication of
THE SOUTHEASTERN SURGICAL CONGRESS
THE SOUTHWESTERN SURGICAL CONGRESS

Published Monthly by
The AMERICAN SURGEON PUBLISHING COMPANY
701 Hurt Building, ATLANTA 3

Subscription in the United States, $8.00

Volume XVII November, 1951 Number 11

THE PHYSICIAN-PATIENT RELATIONSHIP IN CASES OF MALIGNANT DISEASE

In cases of malignant disease, the physician-patient relationship is often accompanied by more than the usual difficulties. While general principles can be laid down for guidance, it is not practical to establish a set of rules which would be applicable to all cases. The welfare of the patient should be given primary consideration, but the rights of the physician must be respected. Even before the diagnosis has been completed, the question arises as to what to tell the patient and how it should be done. Though the nature of the disease is apparent, it is advisable to make no definite statement until the diagnosis has been firmly established and all pertinent data obtained. Until then, one can not speak with any degree of assuredness of the certainty of the diagnosis or as of the best plan of treatment. Anxious relatives should be reassured that most careful consideration will be given and that the patient will be told nothing without first conferring with them.

The patient is the individual primarily concerned and it naturally

Department of Surgery, The Medical College of the State of South Carolina and Roper Hospital, Charleston, S. C.

follows that he is entitled to a knowledge of his condition. Any such request on his part should be considered in this light. He may desire it so as to arrange his personal and business affairs while his state of health is still reasonably good. In spite of this, it is important that there be no haste or abruptness in informing him. An action of this nature might rightly be considered as callous on the part of the physician. At first, the questions should be parried or evaded. This may be the best course to pursue for some length of time and, in some cases, indefinitely. Patients who really wish to be informed are likely to manifest their desire by persistently asking direct questions. Without this attitude on the part of the patient, the physician should be hesitant about making any move in this direction.

Some patients request that they be not told if malignancy is found. Others accomplish the same purpose by asking no questions, even when given an opportunity to do so. In such cases, the wishes of the patient should be respected, but some responsible member of the family should be informed.

There are some obvious instances where it is inadvisable to inform patients of the presence of malignancy. Nothing is gained by so doing when the patient is seriously ill or has evidence of mental disease. Some patients are so constituted emotionally that they can not face the facts when they are placed before them. Again, some are of such low intelligence that they would be unable to understand. In such cases, decisions as to treatment must be made by the physician and responsible relatives.

Once it has been decided to inform the patient, the time and conditions must be given careful consideration. It is well to confer with the family beforehand and also to have one or more members present at the time. In discussing the matter with the patient, the physician should be as encouraging as possible and, at the same time, make certain that the patient has an adequate understanding. In many cases, this can be done in general terms and the use of the word cancer preferably avoided. Taking care to stay within the bounds of truth, the physician should be as optimistic as conditions permit, especially as regards chances of cure. To prognosticate in other than general terms is risky and obviously unwise, especially is this true as regards the course of the disease and life expectancy. Opportunity should be given to the patient to ask questions which may occur to him at the time or subsequently, by visiting him alone, rather than with house physicians and nurses.

Most individuals are able to face the situation and adjust themselves reasonably well to it. Furthermore, they appreciate the

physician's frankness in telling them the truth. Members of the family are more likely to be upset and resentful of the action of the physician but, with patient explanation, they generally realize that it is for the best. A suffering and uninformed patient may be unreasonable and demanding, but upon learning the truth he is likely to assume a better mental attitude and be less of a burden upon his family. The establishment of a common understanding is the best means of relieving tension.

Well-meaning relatives frequently importune the physician to keep the patient ignorant of the malignant nature of his disease. Even should he acquiesce, in many cases such a course is not practical and it may even work to the disadvantage of the patient. In order to carry out such a plan, the first misrepresentation must be followed by a succession of others, each increasingly difficult, and an impregnable wall must be built up around the patient so as to maintain the false front. In spite of these efforts, the patient is likely to become suspicious, or at least discouraged at his lack of progress, and seek medical advice elsewhere, often at ill-afforded expense. Upon becoming aware of the nature of his illness, the patient is likely to lose confidence in his physician, though appreciative of his motives, and is thus deprived of his best source of help at the time he most needs it. Under some conditions, it is impossible to treat effectively an uninformed patient, particularly if his cooperation is needed or he must give his consent for the performance of an operation attended by undue risk or followed by mutilation.

The physician should not be asked to misrepresent the truth and it is within his right to refuse to do so. By being a party to such procedure he is likely to lose the confidence of the patient and certain to lose it of those who made the request. They themselves would not consult him with any degree of assuredness that they would obtain a frank discussion of their own problems. His usefulness would be greatly impaired. The physician must realize that although his action is motivated by kindness, he can not relieve the patient of his burden and that he can best help him on the basis of a mutual understanding so that both the physician and the patient can face the problem together.

WILLIAM H. PRIOLEAU, M.D.

BOOK REVIEWS

The Editors of THE AMERICAN SURGEON *will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The editors do not, however, agree to review all books that have been submitted without solicitation.*

MICRO-RADIOGRAPHY AND OTHER RADIOLOGICAL TECHNICS IN BIOLOGICAL RESEARCH. By ALFRED E. BARCLAY. Springfield, Ill., Charles C Thomas.

Micro-radiography deals with the study of enlarged roentgenograms of thin sections of tissue. If the vessels have been previously injected with some radiopaque material the process is termed micro-arteriography. In this little book Dr. Barclay has assembled material on these subjects such as has never before been published.

The possibilities of this research method are enormous. One practical result has been the demonstration of the sensitive shunt mechanism between the arterial and venous circulations in the kidney, skin, and gastric mucosa which will influence future research on structure and function of all tissues. Its use in the study of the "crush" syndrome is also discussed.

Discussion of technics and inclusion of numerous excellent reproductions make this volume of value to everyone engaged in medical research.

LEONARD LONG, M.D.

ANATOMY IN SURGERY. By PHILIP THOREK, M.D., F.A.C.S., F.I.C.S., Clinical (Asst.) Professor of Surgery, University of Illinois College of Medicine; member of The American Board of Surgery; Assistant Professor of Topographic Anatomy in Clinical Surgery, Cook County Graduate School of Medicine; member of the American Association of Anatomists; Fellow of the American College of Chest Physicians; Co-surgeon in Chief of the American Hospitals; Associate and Chief of the American Hospital; Associate attending surgeon of the American Hospital; Associate Attending Surgeon of the Cook County Hospital; Senior Attending Surgeon of the Surgeon of the Alexian Brothers Hospital. Philadelphia, J. P. Lippincott Co. Cloth Back. 720 illustrations. 211 illustrations in color. $22.50.

This volume is the result of 17 years' experience in teaching anatomy and surgery and has been written with medical and graduate students in mind. This volume, while predominantly printed material, is adequately and nicely illustrated. In general, in each chapter the embryology is first reviewed and then gross anatomy including the blood and nerve supply is discussed. There then follows a brief discussion about the surgery of the area. The author has been kind enough to include also little hints of operating technics of which he is truly a master. One such instance is found in the chapter concerning the common carotid artery, where he suggests that if the aneurysm needle is inserted from the side of the internal carotid artery, the nerve can be more easily avoided. These are quite helpful little hints to the neophyte.

The printing, while fairly small, is easily readable. The illustrations are of the smudge type and are quite uniform (all done by the same artist). It is written in a style which is easily understandable and very descriptive. There is no bibliography (which would require many more sheets of expensive paper). It is not necessary for the real usefulness of this volume. The author and publishers are to be congratulated for their producing an excellent volume for the medical student and surgical interne or resident.

A. H. LETTON, M.D.

Books received are acknowledged in this section, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

CAUSALGIA. By FRANK H. MAYFIELD, M.D., Assistant Professor of Clinical Surgery, College of Medicine, University of Cincinnati, Attending Neurological Surgeon Bethesda Hospital, Christ Hospital, Deaconess Hospital, Good Samaritan Hospital, St. Francis Hospital, and Jewish Hospital, Cincinnati, Ohio. Springfield, Ill., Charles C Thomas. $2.25.

TECHNICAL METHODS FOR THE TECHNICIAN (ed. 4). By ANSON LEE BROWN, B.A., M.D., President of Anson Lee Brown, Inc., Successor to: Dr. Brown's Clinical Laboratory and Dr. Brown's School for Technicians, Columbus, Ohio, published by the author. $10.00.

INSTRUMENTS AND APPARATUS IN ORTHOPAEDIC SURGERY. By E. J. NANGLE, M.B., Ch.B., F.R.C.S., formerly Resident Surgical Officer, Royal National Orthopaedic Hospital, Stanmore and R.S.O., Wingfield-Morris Orthopaedic Hospital, Oxford Beit Fellow, Blackwell Scientific Publications, Oxford. Springfield, Ill., Charles C Thomas. $9.50.

A SYNOPSIS OF ANESTHESIA (ed. 2). By J. ALFRED LEE, M.R.C.S., L.R.C.P., M.M.S.A., D.A., F.F.A., R.C.S., Consultant Anesthetist to General Hospital, Southend; General Hospital, Rochford; Runwell Hospital; King George Hospital, Ilford. Baltimore, The Williams & Wilkins Co.

THE ESSENTIALS OF MODERN SURGERY (ed. 4). By R. M. HANDFIELD-JONES, M.C., M.S., F.R.C.S., Senior Surgeon to St. Mary's Hospital; Lecturer in Surgery, St. Mary's Hospital Medical School; Member of the Court of Examiners, R.C.S., and Examiner in Surgery to the University of London; Late Hunterian Professor, R.C.S., and Sir Arthur E. Porritt, K.C.M.G., C.B.E., M.A., M.Ch., F.R.C.S., A Surgeon to His Majesty the King; Surgeon, St. Mary's Hospital and Royal Masonic Hospital; Consulting Surgeon, Acton, North Herts and South Beds, Reddington, Hampton Wick and District, and Paddington (L.C.C.) Hospitals; Examiner in Surgery, University of Cambridge. Baltimore, The Williams & Wilkins Co. $11.00.

ABSTRACTS FROM CURRENT LITERATURE

DUODENOSTOMY. TECHNIC FOR MANAGEMENT OF DUODENAL STUMP IN CERTAIN CASES OF PARTIAL GASTRECTOMY FOR DUODENAL ULCER. James T. Priestly and Donald B. Butler. *American Journal of Surgery 82*:163-166 (July) 1951.

Following a discussion of the various problems encountered in closure of the duodenal stump, the authors advocate the employment of duodenostomy by indwelling catheter. It is not suggested that duodenostomy should ever be employed as the method of choice but rather that it be used as a method of election when other methods cannot be used with safety. The technic described herein is essentially that described by Welch in 1949. The author's description of the technic is quoted in part:

"This procedure consists simply of closing the open end of the duodenum around an appropriate catheter, perhaps a size 20 F straight latex type. That portion of the duodenum which can be sutured satisfactorily is closed and the catheter is permitted to remain where satisfactory closure is difficult or impossible without endangering adjacent structures or the wall of the duodenum by further mobilization. Purse-string sutures placed around the catheter may be helpful. . . . The catheter is brought out . . . through a stab wound. . . ."

"The catheter is connected with a bottle . . . so that the fluid . . . may be collected and measured. This . . . is helpful . . . in judging . . . replacement of fluid and electrolytes. . . . Ten or 12 days after operation, the catheter may be clamped . . . (and) may be withdrawn 12 to 14 days after operation."

R. H. S.

THE VALUE OF BLOOD VOLUME DETERMINATIONS IN RADICAL OPERATIONS FOR CANCER OF THE HEAD AND NECK, INCLUDING MEASUREMENTS OF OPERATIVE BLOOD LOSS. Henry P. Royster, Henry P. Pendergrass, James M. Walker and Marie Barnes. *Annals of Surgery 133*:830-836 (June) 1951.

One of the chief causes of death in radical operations for malignant neoplastic disease of the head and neck is loss of blood on the operating table. Royster and his co-workers have made observations on 45 patients who underwent 54 radical operations on the head and neck (immediate operative patient mortality, 8.8 per cent; operation mortality, 6.8 per cent). Blood volume determinations were done on 22 patients and in 17 of these the data obtained were sufficient for a critical estimate of the value of the test. Serial blood volume determinations were done in 22 patients. Accurate recordings of transfused blood were available in all cases.

The Evans' blue dye T-1824 method was used. The average of three readings from the three specimens forms the basis for calculation of the effective circulating plasma and blood volumes in the usual manner. Blood loss was measured by the gravimetric technic of weighing sponges at frequent intervals during the course of the operation as described by Wangensteen et al. Preoperative and postoperative studies were obtained.

Sixteen of the 22 patients had blood volume deficits prior to operation. The greatest deficits occurred in those patients with oral cavity lesions who had had symptoms for three months or longer. Preoperative infusions of blood in these deficient patients was considered helpful in preventing shock. Blood loss during operation was high, varying from about 1500 to slightly

over 4000 cc. Average loss per hour of operating time varied from 376 to 770 cc. No patient with controlled blood balance suffered hemorrhagic shock, whereas 4 of 10 uncontrolled cases exhibited shock on the operating table.

The authors conclude that blood volume determinations play a valuable part in the clinical management of patients undergoing prolonged bloodletting procedures on the head and neck and they have adopted frequent gravimetric measurement of operative blood loss as a routine method in radical operations upon the head and neck.

R. H. S.

HYSTERECTOMY: A PERSONAL EXPERIENCE WITH TWO THOUSAND CONSECUTIVE CASES IN PRIVATE PRACTICE. Curtis Tyrone with John C. Weed. *Annals of Surgery 133*:819-829 (June) 1951.

This is a report of 2000 consecutive hysterectomies performed in private practice by the senior author (C. T.) during a 19 year period ending Dec. 31, 1949. The indications for operation were essentially the same as those in most reported series. There were only four deaths in the series, giving a mortality rate of 0.2 per cent. Causes of death were cardiovascular accident, peritonitis (arising from a pyometra secondary to sarcoma of the uterus), intestinal obstruction and pulmonary embolism—one death being attributable to each of these causes.

In explanation of the very low mortality rate, Tyrone emphasizes that these were all private patients, the surgery was done under more or less favorable circumstances, all the operations were actually performed personally, a carefully standardized preoperative and postoperative plan was followed, and finally, he modestly takes refuge in the claim of an extraordinary run of good luck.

Of the 2000 cases, 1457 were total abdominal, 373 vaginal, and 170 supravaginal abdominal operations; 691 patients had had previous pelvic surgery. The authors deplore the sort of conservatism in which a functionless uterus remains. They feel that the present concept of hysterectomy with the wider indications upon which it is performed serve the best interests of the patients.

"From every standpoint total hysterectomy . . . proved to be a safe and satisfactory operation. It was performed almost exclusively in the last years of the 19 year period covered by this experience."

R. H. S.

COMBINED ABDOMINOPERINEAL EXCISION OF THE RECTUM; A PLAN FOR STANDARDIZATION OF THE PROXIMAL EXTENT OF DISSECTION. David State. *Surgery 30*:349-354 (Aug.) 1951.

Noting the lack of unanimity among authorities in regard to the desirable extent of proximal dissection in combined abdominoperineal excision for carcinoma of the rectum, State herein advocates resection of the descending colon and the left one-fourth of the transverse colon with lymph node dissection to be carried along the aorta and vena cava from the level of the duodenum downward. He states that the resulting transverse colostomy is just as easily controlled as a sigmoid colostomy. He feels that the operation as outlined meets the dictates for a good cancer operation since it is based on anatomic distribution of afferent lymphatics.

R. H. S.

HEMIPELVECTOMY FOR TUMORS OF BONE; REPORT OF FOURTEEN CASES. Bradley L. Coley, Norman L. Higinbotham, and Claude Romieu. *American Journal of Surgery 82*:27-43 (July) 1951.

Hemipelvectomy implies an operation which removes en masse an entire lower extremity together with the corresponding innominate bone and contiguous structures. Strictly speaking, procedures which do not divide the symphysis pubis and the sacro-iliac joint should not be termed hemipelvectomy.

Though the first such operation was credited to Billroth, Girard reported the first successful case in 1898. The contributions of Pringle and Gordon-Taylor were important and the author credits the latter with the revival of interest in the operation. Gordon-Taylor was able to report a total of 21 cases by 1946. In the early years, the mortality rate was 70 per cent. Ten years later this had been cut in half, and at present is estimated at 15 per cent.

One of the principal indications for hemipelvectomy is a primary malignant tumor of the innominate bone or of the proximal end of the femur with extension beyond the limits of hip joint disarticulation. This communication is a report of 14 such cases treated by hemipelvectomy.

In the series there were 12 males and 2 females. The average age was 45.0 years. Eleven of the 14 had had either biopsy, roentgen therapy, or attempts at removal prior to hemipelvectomy. Eleven of the patients had chondrosarcoma and 3 had osteogenic sarcoma.

In the chondrosarcoma group, 8 are living and 3 are dead. The survival periods range from 50 months to two months, none showing evidence of recurrence. The survival periods of the 3 who died were 26, nine, and five months.

The results in the osteogenic group compare unfavorably. All 3 died with survival time of only five, four and one-half and three months.

Necrosis of the skin flaps and persistent sinus were the most frequent complications. Despite the magnitude of the operation, the patients recover rapidly. Four of the patients in this series are successfully wearing prosthesis.

The authors conclude that their results in hemipelvectomy performed for osteogenic sarcoma lead them to question the wisdom of the employment of this procedure for this type of bone tumor. The procedure may be of value in selected cases for long term palliation.

Chondrosarcoma of the innominate bone or the upper end of the femur offers the strongest indication for the operation.

A description of the operative technic as employed by the authors is included.

R. H. S.

THE OPERATIVE TREATMENT OF CARCINOMA OF THE CERVIX. RADICAL PANHYSTERECTOMY WITH PELVIC LYMPH NODE EXCISION. Alexander Brunschwig. *American Journal of Obstetrics and Gynecology 61*:1193-1206 (June) 1951.

The revival of interest in surgical treatment of carcinoma of the cervix, which has been stimulated by extension of the surgical attack on malignant neoplastic disease in general, has prompted Brunschwig to review the historical background of this operation in connection with this presentation of the radical operation which he has employed during the last three years at Memorial Hospital. Beginning with the total hysterectomy for "sarcomatous disease" of the uterus by Burnam, isolated instances of radical operation for

cancer are cited. The author notes that J. G. Clark's report in 1896 of 10 cases operated on at Johns Hopkins Hospital preceded Wertheim's original article and credits the then great influence of the Viennese school with the fact that the operation has come to bear Wertheim's name. By 1913 Clark had come to consider the radical operation to carry too high a mortality rate and was contenting himself with excision of the parametria with a wide vaginal cuff. With the advent of radiation therapy, interest in the surgical attack waned but certain authorities never abandoned the procedure. Meigs has recently resurrected the issue and has demonstrated that the mortality could be maintained at least as low as that imputed to irradiation.

The operation employed by Brunschwig as herein described is characterized by a thorough en bloc resection of all the retroperitoneal lymph bearing tissues from the origin of the common iliac arteries downward and laterally, all structures being stripped clean except the ureters which are left a modicum of areolar covering for preservation of the blood supply. At least half, preferably two-thirds, of the vaginal tube is resected. The vagina is not closed and the pelvis is not reperitonealized. The pelvis is packed with a wide gauze stip, the end of which is brought out through the vagina. When the lesion is large and fungating and has spread considerably along the vagina, a preliminary perineal operation is done to fashion a vaginal cuff to sew over the cervix. The abdominal operation is then carried out as above.

Included is a discussion of postoperative care and the more frequent complications of the procedure. No results of the operation are presented at this time, but in the series of 225 patients only one operative mortality occurred, giving a mortality rate of less than 0.5 per cent. Brunschwig feels that this refutes the argument, previously advanced, that the operation carries appreciable mortality. He emphasizes that no general advocacy of the procedure for treatment of carcinoma of the cervix is implied.

R. H. S.

RADICAL GROIN DISSECTION FOR CARCINOMA. A SIMPLIFIED OPERATIVE PROCEDURE. S. N. Mendelsohn and R. D. Mansfield. *Surgery, Gynecology and Obstetrics* 92:432-436 (April) 1951.

Following a review of the indications for radical groin dissection, the authors describe an operative procedure based upon anatomical dissections and following the approved concepts of cancer surgery which they feel provides excellent exposure of the region without division of the inguinal ligament. They feel that by avoiding the division of this structure, certain complications and difficulties are eliminated. Their description of the operative procedure is quoted:

"A long incision is made from a point in the flank just anterior to the tip of the twelfth rib and carried in a slightly curved manner across the mid-point of the inguinal ligament into the thigh and over the femoral triangle. The skin flaps thus formed are reflected to each side keeping attached only a thin layer of subcutaneous fat in the same manner in which the skin flaps in a radical breast operation are reflected. The sapenous vein is then located in the distal portion of the incision and incised between ligatures.

"The lymph nodes lying along each side of the saphenous vein and those along and below the inguinal ligament, together with one or two nodes found above the inguinal ligament in the hypogastric area, and the fat in which these nodes are imbedded, are excised as one mass. When this dissection is

complete, the deep fascia of both the abdomen and thigh are exposed and clean, and the mass of fat with contained lymph nodes is attached by a pedicle to deeper structures. Within this pedicle lie the saphenous vein going deep to join the femoral vein and lymph channels which drain the superficial into the deep nodes. This mass of fat and lymph tissue may be left until the end of the procedure; however, in our opinion it is better to remove it at this time in order to improve exposure and lessen the possibility of malignant cells being massaged around by manipulation.

"Next, the incision is deepened by incising the flat muscles of the abdomen and the fascia lata in the thigh both in the line of the skin incision. At this time the inguinal ligament may be incised over the femoral canal if desired. We have not found it necessary to do so. If the ligament is incised, the operator must be on the lookout for an anomalous obturator artery which arises from the pubic branch of the deep epigastric (in approximately 35 per cent of patients).

"When the peritoneum is rolled medially by blunt dissection, the entire course of the iliac and femoral vessels is demonstrated from the bifurcation of the aorta to the apex of the femoral triangle. The lymph tissue, nodes, vessels, and areolar connective tissue are now dissected from the iliac nerves from the bifurcation of the aorta downward. When the inguinal ligament is reached, the dissected lymph tissues may be pushed through the femoral canal or incised at this level and the dissection continued below. In either event, there is a lymph node usually lying in the femoral canal which must be removed. Below the inguinal ligament, the dissection is continued. Here the nodes are found lying in the medial aspect of the femoral vein. The end of the dissection is reached at the apex of the femoral triangle.

"The wound is now inspected for bleeding points and if the area is completely dry it is closed in layers with interrupted cotton sutures. It is advisable to insert a Penrose drain or two."

Diagrammatic illustrations accompany the description.

R. H. S.

ANNUAL ASSEMBLY OF THE SOUTHEASTERN SURGICAL CONGRESS

The next annual assembly of The Southeastern Surgical Congress will be held in Atlanta, Georgia, at the Biltmore Hotel, March 10, 11, 12, 13, 1952, jointly with The Atlanta Graduate Medical Assembly.

The surgical lectures will be held in the Georgian Ballroom of the hotel and the medical lectures in the exhibition hall, and as far as possible the lectures will run simultaneously.

Please make your reservations early.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233).

Of The American Surgeon, published monthly at Atlanta, Georgia, for September, 1951.

1. The names and addresses of the publisher, editor, managing editor, and business manager are: Publisher: The American Surgeon Publishing Company, 701 Hurt Building, Atlanta, Ga. Editor: Dr. Thomas G. Orr, Kansas City, Kans. Managing Editor: Dr. B. T. Beasley, Atlanta, Ga.

2. The owner is: The Southeastern Surgical Congress and The Southwestern Surgical Congress, composed of surgeons of the Southeast and the Southwest. Not incorporated or operated for profit.

B. T. BEASLEY, M.D., Managing Editor.

Sworn to and subscribed before me this 17 day of September, 1951.
MRS. J. H. BAUKNIGHT, Notary Public.
(My commission expires Feb. 23, 1952)